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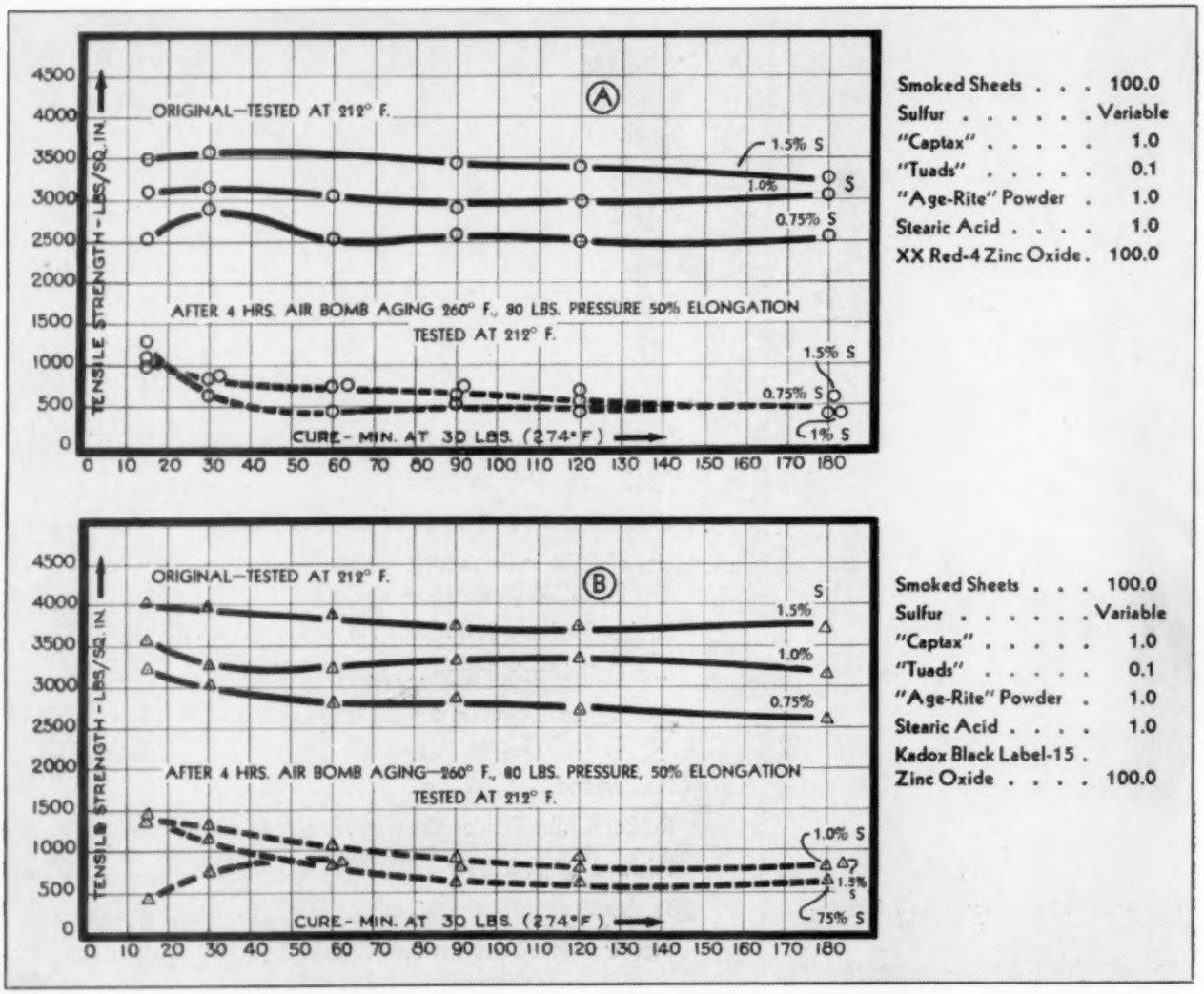
No. 54 of a series of charts showing a comparison of "FAST-" and "SLOW-CURING" zinc oxides with typical accelerators.


TENSILE STRENGTH - LBS/SQ. IN.
ORIGINAL—TESTED AT 212° F.
Ⓐ
1.5% S
1.0% S
0.75% S
AFTER 4 HRS. AIR BOMB AGING 260° F., 80 LBS. PRESSURE 50% ELONGATION
TESTED AT 212° F.
1.5% S
0.75% S
1% S
CURE - MIN. AT 30 LBS. (274° F)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
0 500 1000 1500 2000 2500 3000 3500 4000 4500
Smoked Sheets . . . 100.0
Sulfur . . . . . Variable
"Captax" 1.0
"Tuads" 0.1
"Age-Rite" Powder . 1.0
Stearic Acid 1.0
XX Red-4 Zinc Oxide . 100.0
TENSILE STRENGTH - LBS/SQ. IN.
ORIGINAL—TESTED AT 212° F.
Ⓑ
S
1.5%
1.0%
0.75%
AFTER 4 HRS. AIR BOMB AGING—260° F., 80 LBS. PRESSURE, 50% ELONGATION
TESTED AT 212° F.
1.0% S
1.5% S
.75% S
CURE - MIN. AT 30 LBS. (274° F)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
0 500 1000 1500 2000 2500 3000 3500 4000 4500
Smoked Sheets . . . 100.0
Sulfur . . . . . Variable
"Captax" 1.0
"Tuads" 0.1
"Age-Rite" Powder . 1.0
Stearic Acid 1.0
Kadox Black Label-15 .
Zinc Oxide 100.0

In applying the principle of low sulfur compounding to stocks containing high loadings of zinc oxide, it is necessary to increase the sulfur content over that normally used with other reinforcing pigments in order to obtain optimum tensile properties. The effect of increasing the sulfur content from 0.75% to 1.5% is shown with **Horse Head XX Red-4** and **Kadox Black Label-15** in Charts A and B respectively. It should be noted that both original and aged tensiles were obtained at 212°F. and that the increased sulfur content does not lower the air bomb aging properties even when tested under the extremely severe conditions of a 50% stretch. Zinc oxide at vulcanizing temperatures combines with sulfur forming zinc sulfide, thereby reducing the amount available for the vulcanization reaction.

UNIFORM QUALITY ZINC OXIDES

THE NEW JERSEY ZINC COMPANY

The Rubber Age

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United Air Lines' new twelve-ton, three-mile-a-minute Mainliner

Rubber in Aviation

By George Mason

NEVER before in the history of commercial aviation has the subject of rubber been so important as it is in 1937, as exemplified in the new $3,000,000 fleet of luxurious Mainliner transports recently placed in transcontinental service by United Air Lines. This new fleet is an excellent example of the growing part played by rubber to make flying safer and more comfortable. In the early days of flying, rubber was a relatively unimportant item, being chiefly confined to the tires. Constant demand on the part of passengers for quieter cabins and planes with less vibration prompted a turn to the rubber industry by aviation engineers.

Paving the way for smoother performance of air transports on the ground, particularly in softened landings, was the development of a new airplane tire commonly referred to as the air wheel or "doughnut" tire. The largest air wheel tire ever produced for a commercial air liner is part of the standard equipment on the new twelve-ton, three-mile-a-minute Mainliners, built to United specifications by Douglas Aircraft, with tires by Goodrich.

The Mainliners are equipped with two 1150 horsepower engines, both mounted on rubber, the "biscuits" absorbing a good deal of the vibration. Vibration was also a source of trouble in the development of "blind" or instrument flying. Flying of this nature brought about a definite need for exceedingly accurate instruments, vibration affecting such accuracy. Mounting the entire instrument panel of the Mainliners on rubber eliminated visible vibration, which, in turn, has greatly increased the efficiency of the many instruments.

All radio equipment, both receivers and transmitters, are also rubber mounted, permitting clearer reception and sending. The ear-phones used in connection with

this radio equipment have cup-shaped rubber pads that fit over the pilot's ears, shutting out all undesirable noises while he is listening to the directional beams.

De-icers, the "rubber boot" or leading edge overshoe developed by Goodrich in conjunction with major air lines and the Air Corps, is also standard equipment on the Mainliner fleet. This device, which inflates and deflates by the operation of a rotary motion distributing valve controlled by the pilot, the necessary air being supplied from the discharged air of the vacuum pumps of the motor, prevents ice formation on the wing tips. The new planes, however, make use of another Goodrich development in connection with the De-icers, the "Rivnut."

After solving the problems of installation on the wing tips, it was discovered that at high speeds the De-icers, bonded to the metal skinned wings by special cement, showed a tendency to loosen in flight. Since a loose De-icer had little value, Goodrich engineers developed the "Rivnut," a mechanical fastening device to keep the "rubber boots" in place. This device is a hollow, threaded rivet which can be applied entirely from one side of a metal surface and may be obtained with a key underneath the head to prevent turning. Two special tools were also developed in connection with the "Rivnut," one to cut a seat for the key and the second a heading tool with a threaded mandrel which engages all the threads and heads of the "Rivnut" on the inaccessible side of the work.

Airfoil De-icers are also utilized on the Mainliners. These special De-icers are used in connection with the control surfaces and the radio mast and follow the same principles as those for the wings except that being mounted over a smaller airfoil only two tubes are used instead of three. When inflated these devices give a scalloped effect which leaves practically no dead areas to which ice can cling. Spinner covers, which provide for feeding anti-freeze solutions or oil to the propeller blades, are provided by Goodrich on these ships.

The interior of the cabins on the Mainliners were laid out by sound engineers in an attempt to better railroad sleeping car conditions. Cabin regions of high noise intensity are not used for passenger accommodations of any kind. In accomplishing this purpose, all individual seats were mounted on soft rubber, all paneling was mounted on rubber blocks and the floor was mounted on long sheets of rubber, separating it completely from the fuselage.

In addition to rubber-insulated wire, grommets, packings and other minor articles made of rubber, United Air Lines pioneered in the air transport field in some respects. One ship in the Mainliner fleet is known as the Skylounge, claimed to be the world's most luxurious high speed transport. Fourteen individual, large, overstuffed swivel chairs are generously spaced in a cabin normally accommodating twenty-one chairs. Each of these fourteen chairs are upholstered with Nukraft, the latex-impregnated hair fabricated into loops forming a structure of "figure 8" springs, developed by Goodrich. In addition to passenger comfort, Nukraft upholstery is highly sanitary since it is immune to all vermin.

Another feature of the Skylounge is the use of a rubber hassock made by Goodrich to United specifications. These hassocks, one of which is placed in front of each of the fourteen chairs in the cabin of the ship, are made of layers of Nukraft sheets, 10x20x7 plied up, covered with a durable fabric.

Every passenger convenience is provided on the Skylounge. Each traveler is given a rubberized kit, ladies finding a compact, powder puff, skin lotion and comb in their kits, and gentlemen are supplied with a razor, comb, nail file, shaving cream, tooth brush and tooth paste.

With the advent of luxurious air travel, a broader field for rubber manufacturers has opened. A standard has apparently been set by United Air Lines' Mainliner fleet, now in non-stop service between New York and Chicago and shortly to be placed in overnight coast-to-coast service, which other air lines are bound to follow. Many of the rubber improvements on these commercial transports are being adapted to other types of planes, both military and commercial.

Seats on United Air Lines' new Skylounge are mounted on soft rubber, while the hassocks which are placed in front of each seat are composed of layers of Nukraft sheets, covered with a durable fabric. The side paneling is mounted on rubber blocks and the floor on long sheets of rubber, separating it from the fuselage.

Improvements in Rubber Insulating Compounds[1]

By Samuel J. Rosch

Manager, Insulated Products Development,
Anaconda Wire and Cable Company

Accelerated Aging Tests

GENERAL:

Before mentioning some of the other types of rubber insulating compounds developed to meet a given set of operating conditions, it would probably be well to pause a moment to consider the various types of accelerated aging tests, their applicability, when they should be used, and an attempt at an interpretation of the respective results obtained with them.

When a patient has a fever, the doctor cannot wait until the patient succumbs or recovers in order to note whether the medicine he has prescribed will produce the required results. He must have an immediate and quantitative method that will show him the trend the patient's condition is taking and the reactions to some new and hitherto untried stimulant. For that purpose, he uses a thermometer and the count of the pulse as guides, each of these being a different type of guide in indicating the patient's condition.

So, too, the rubber chemist with the vast field of new and highly recommended ingredients to choose from, cannot wait 10 to 20 years to determine whether a particular rubber compound will have lasting qualities, but must submit these compounds to a standard series of accelerated tests which, in a comparatively short space of time, will give him a quantitative indication of the life that may be expected of that particular rubber insulation, operating under a given set of service conditions.

There are two types of physical and chemical deterioration taking place in a rubber compound that we are trying to prevent or retard with these new chemical ingredients. These forms of deterioration may be due to: (1) Excessive heat; (2) Oxidation.

The accelerated aging tests which we are to discuss have been designed so as to anticipate to a degree these types of deterioration. For example, the effect of heat upon a rubber compound is studied by its reactions under the Geer Oven and Air Bomb tests. The effect of oxidation upon a rubber compound is studied by its reaction in the Oxygen Bomb. The tests which we will consider are as follows: (1) Geer Oven; (2) Oxygen Bomb; and (3) Air Bomb.

GEER OVEN TEST:

In this test, samples of the rubber insulation or of the completed wire are placed in an oven having circulating air at a temperature of 70° C. (158° F.) and permitted to remain there for a given period of time. The ASTM Performance compounds require, for example, that after 96 hours in the Geer Oven, the maximum depreciation in tensile strength shall not exceed 15%. On the other hand, the Federal Specification Board, in its revision of Specification JC-101a, has stipulated that their type of Code grade insulation, after 168 hours in the Geer Oven, shall have a maximum depreciation in tensile strength not in excess of 40%.

Rubber insulations of the heat resisting class, designed to operate at temperatures in excess of the maximum permitted by the A.I.E.E. rules, are also judged by their reaction to the Geer Oven test, but in such cases the temperatures used in the test, are considerably higher than the 70°C. previously mentioned. For example, three different products of this nature have their heat resisting qualities measured by the following conditions in the Geer Oven: 960 Hours at 158° F.; 504 Hours at 212° F.; and 144 Hours at 255° F.

OXYGEN BOMB TEST:

In this test, a sample of the insulation or insulated wire is placed in a bomb capable of withstanding an internal pressure of 300 lbs. per sq. in. The bomb is usually immersed in some heated liquid so as to maintain a uniform temperature within the interior of the bomb. The tests are conducted with the bomb containing oxygen at a pressure of 300 lbs. per sq. in. ± 10 lbs. and at a temperature of 70°C. (158° F.). The ASTM Performance compounds require that after 96 hours in the oxygen bomb, the maximum depreciation shall not exceed 25%.

The only variations that have been suggested on this type of test have been not in the temperature of application or the pressure of oxygen used, but rather in the length of time of exposure. For example, some purchasers have felt that 96 hours was insufficient to secure a proper idea of the durability of a rubber compound, and accordingly have extended the time of exposure to 240 hours. Super-aging compounds are usually judged by their ability to withstand the deteriorating influence of the oxygen bomb for 21 days or 504 hours without showing a depreciation in tensile of more than 30%.

For the same length of time and temperature, the Oxygen Bomb test is considerably greater in severity than the Geer Oven test, because in addition to the effects of temperature, we also have the effect of oxidation at very high pressures.

AIR BOMB TEST:

As the accelerated aging tests became more universally acceptable, better aging qualities were desired by both consuming and manufacturing interests. To determine the better aging properties, it was necessary

[1] Concluded from THE RUBBER AGE, January, 1937, pp. 219-221.

to carry on long time aging tests either with the Geer Oven or the Oxygen Bomb test. Not only were these tests time consuming, but ofttimes the results obtained with the test when ¾ completed would indicate that the particular compound did not have the desired characteristics. It was therefore felt by many that a new type of test would have to be developed which, in a comparatively short time, would yield results comparable with those obtained under the long time Oxygen Bomb test.

It is well known that many phenomena in nature double the severity of their effect with approximately every 10°C. rise in temperature. A consideration of this particular fact soon led to the suggestion of the Air Bomb test. In this test, a sample of insulation or of the insulated cable is placed into a bomb containing air at a pressure of 80 lb. per sq. in. and at a temperature of 260° F. The bomb is usually in the form of a steam jacketed cylinder, the steam jacket being used for maintaining the desired temperature within the interior of the bomb.

It has been found that for certain types of rubber insulating compounds, 5 hours of exposure to the Air Bomb test, produces deterioration in tensile properties comparable to those produced after 21 days or 504 hours in the standard Oxygen Bomb test. On the other hand, with certain types of loading chemicals in rubber compounds not intended for electrical insulating purposes, it requires a considerably longer period in the Air Bomb, say in the nature of 15 to 24 hours, in order to produce the same deterioration in tensile as that produced on this particular compound after 21 days in the Oxygen Bomb.

The importance of this particular test lies in the fact that it is admirably adapted to the study and further development of superior aging types of rubber compounds. When this test was first developed, there were very few rubber compounds available on the market which could withstand exposure for 5 hours without reverting either into a liquid or to a state of brittleness. The significance of the progress in rubber compounding, especially in such compounds as are designed primarily to withstand the effects of continued elevated temperatures, can best be understood in the light of this very severe test. Whereas it is true that the Air Bomb test is but of recent origin, nevertheless, the interest that it has aroused, especially as to the possibilities of using it in modified form for various types of rubber compounds, indicates that it is destined to occupy an important place in the future testing of rubber quality.

Accelerated vs. Natural Aging

The question often arises as to the significance of these accelerated aging tests and how they can possibly be used to anticipate the life of a given rubber compound, as a result of these tests. Investigators in this field have at various times indicated that 24 to 30 hours in the standard Geer Oven test and 9½ to 12 hours in the Oxygen Bomb test are approximately the equivalent of one year of natural aging. This data has been obtained by taking a given series of compounds and testing part of them under the Geer Oven and Oxygen Bomb tests, while the major portion was subjected to shelf aging with test specimens taken periodically.

In a paper presented by Dr. Dunsheath of the Henley Cable Company, before the Association of Mining Electrical Engineers, during April, 1934, it was pointed out that his company had exposed a number of compounds to natural aging in India, and had also made both the Oxygen Bomb and Geer Oven tests on the same compounds. A comparison of the data showed that one day's Geer Oven aging was approximately equal to six months of natural aging in India, and one day's Oxygen Bomb test was approximately equivalent to 12 months of natural aging, also in India. This data seems to check the values previously obtained in the tire industry.

There may be rubber compounds which have in the past given satisfactory service but which would show up very poorly under the accelerated aging tests. On the other hand, it is our firm conviction that any compound which does show a low rate of deterioration under these accelerated aging tests will definitely give long time service as far as physical and chemical stability are concerned. The results of any of these particular tests must be interpreted in the light of a trend, and not in attempting to correlate hours of aging with any definite figure of anticipated years of service.

Special Rubber Insulations

There have been a number of special insulating compounds developed during the past five or six years to meet certain special operating conditions. Some of these are:

(a) The Ozone Resistant Insulation, designed to resist the effects of corona and especially adapted for circuits in excess of 5000 volts.

(b) The Low Voltage Secondary Network Insulation, designed to have poor combustion supporting properties and to be capable of withstanding severe current overloads during emergency conditions. This compound is especially noted for its long time aging characteristics in the Oxygen Bomb test.

(c) The Acid and Alkali Resistant Insulation, especially designed for use in chemical plants, as well as to resist the effect of severe soil acids and alkali.

(d) The Heat Resisting Insulation, designed for service installations where the copper temperature is apt to reach 75°C., a temperature which is 25°C. higher than that permitted by industry standards for Code grade insulation and 15°C. higher than permitted for other rubber insulations.

(e) The Low Moisture Absorbing Insulation, designed and compounded so as to give maximum resistance to moisture absorption as determined by change in electrical capacitance interpreted in terms of S.I.C., after 7 and 14 days immersion in distilled water.

(f) The Super-Aging Type of Insulation, designed to withstand prolonged exposure to the effects of oxidation and temperature up to 75°C.

(g) Latex Insulation, consisting of about 85% rubber applied in liquid form. This type of insulation, although of but comparatively recent origin, has nevertheless made very fair progress and will undoubtedly prove to be a valuable material in the low voltage field.

Electrical Considerations

ELECTRICAL TESTS:

The physical tests of a rubber insulation, no matter how good they may be, can only reflect the physical properties of the compounded rubber and give an indication of the ability of the insulation to withstand certain installation conditions. Neither the physical nor the chemical properties can give any guarantee of

the electrical integrity of the insulation. It therefore is essential to conduct a series of electrical tests depending upon the size of conductor, the thickness and type of insulation as well as the operating voltage. These tests are as follows:

(1) *Routine High Voltage Test:* Conducted on all cables regardless of service.

(2) *Insulation Resistance Test:* Conducted on all cables regardless of service. It is important to note here that extremely high insulation resistance, whereas of value in control and signal circuits, is of little importance in light and power circuits especially at the higher voltages. A high value of insulation resistance is no indication of the dielectric strength of a rubber insulation.

Insulation resistance is generally expressed by the formula:

$$\text{I.R.} = \text{K} \log_{10} \frac{\text{D}}{\text{d}}$$

wherein I.R.=insulation resistance in megohms/1000 feet.

K=a constant depending on the type of insulation

D=diameter (in inches), of the insulated conductor

d=diameter (in inches), of the uninsulated conductor.

Some idea of the general range of the values of K may be obtained from the following table:

Type of Compound	*Minimum Value of K*
National Electric Code Grade	3,800
N.E.M.A. Intermediate Grade	8,000
ASTM Type A, AO or Performance Grade	21,120
High Voltage Ozone Resisting Grade	4,000

(3) *Special Tests for High Voltage Insulation:* Generally conducted on samples of insulated cable intended for voltages in excess of 5000 or on cables insulated with ozone resisting compounds. These tests are: (a) The high voltage-time test; (b) The "U" bend test; and (c) The ozone resistance test.

Each of the above is designed to serve as an indication of the suitability of a given compound to withstand the electrical phenomena occurring with high voltage operation. These tests are now the subject of intense study by both the I.P.C.E.A. and ASTM and should shortly be available to the electrical industry.

SHIELDING:

A more general recognition of the needs of suitably shielding rubber insulated cables operating under various conditions of installation, has led to the adoption of the following rules which are based on sound engineering experience:

(a) Braided cables not supported on insulators, when operating at 6001 volts and over with the neutral grounded, or 3501 volts and over with the neutral ungrounded, shall be suitably shielded.

(b) All lead covered multiple conductor cables, operating at 10,001 volts and over with the neutral grounded, or 6001 volts and over with the neutral ungrounded, shall be suitably shielded.

Rated Circuit Voltage	Size of Conductor AWG or MCM	Insulation Thickness in 64ths per Conductor	
		Grounded	Ungrounded
0-600	14- 9	3	3
	8- 2	4	4
	1- 4/0	5	5
	225- 500	6	6
	525-1000	7	7
	over 1000	8	8
601-1000	14- 8	4	4
	7- 2	5	5
	1- 4/0	6	6
	225- 500	7	7
	525-1000	8	8
	over 1000	9	9
1001-2000	14- 8	5	5
	7- 2	6	6
	1- 4/0	7	7
	225- 500	8	8
	525-1000	9	9
	over 1000	9	9
2001-3000	14- 8	7	7
	7- 4/0	8	8
	225-1000	9	9
	over 1000	10	10
3001-4000	14- 4/0	9	9
	225-1000	10	10
	over 1000	11	11
4001-5000	14- 4/0	10	10
	225-1000	11	11
	over 1000	12	12
5001-6000	14- 4/0	10	12
	225-1000	11	12
	over 1000	12	13
6001- 7,000	8- 4/0	11	14
	225-1000	11	14
	over 1000	12	15
7,001- 8,000	8- 4/0	12	16
	225-1000	12	16
	over 1000	13	17
8,001- 9,000	6- 4/0	13	17
	225-1000	13	17
	over 1000	14	18
9,001-10,000	6- 4/0	14	18
	225-1000	14	18
	over 1000	15	19
10,001-11,000	6- 4/0	15	20
	225-1000	15	20
	over 1000	16	21
11,001-12,000	6- 4/0	16	22
	225-1000	16	22
	over 1000	17	23
12,001-13,000	6- 4/0	17	23
	225-1000	17	23
	over 1000	18	24
13,001-14,000	6- 4/0	18	25
	225-1000	18	25
	over 1000	19	26
14,001-15,000	6- 4/0	19	27
	225-1000	19	27
	over 1000	20	28

Table on Thickness of Rubber Insulation for Grounded and Ungrounded Neutral Circuits 0-15,000 Volts

(c) The shore ends of non-leaded submarine cables, operating at 6001 volts and over with the neutral grounded, or 3501 volts and over with the neutral ungrounded, shall be suitably shielded.

INTERPRETATION OF INSULATION THICKNESS:

Examination of industry specifications during the past five years, reveals the fact that: (a) There was little standardization on the thickness of insulation to be used for a given service voltage. (b) Considerable confusion existed in the matter of the proper interpretation of the actual voltage to ground that existed in a given system.

During this period, the I.P.C.E.A. undertook a study of this situation which ultimately resulted in a solution of both of these problems, a solution which should ultimately offer the wire and cable consumer a considerable saving. This data (see table) is reproduced here, on account of its importance in the proper design of rubber insulated wires and cables.

It is of interest to note that the table recognizes that for the proper design of a rubber insulated cable, using a minimum of insulation thickness, it is necessary to consider the minimum permissible conductor size as well as to know whether the circuit is operating with the neutral grounded or ungrounded so that the proper insulation thickness may be used. There are other factors, however, which are not reflected by the table, which must be taken into consideration in order to give continuity of service. These factors have been incorporated in the following set of guides which are of extreme importance:

(1) For three-phase systems with grounded or ungrounded neutral, use thickness values in accordance with the respective columns of the table.

(2) For single or two-phase systems up to and including 5000 volts, use thickness values in accordance with the grounded column of the table. (Note:

Where it is not definitely specified that a line operates as an isolated single or two-phase system, it shall be considered as a branch of a grounded three-phase circuit and the thickness of insulation shall be that required by the phase to phase voltage of this grounded three-phase circuit as given in the table).

(3) For single or two-phase systems operating at over 5000 volts with one side grounded, multiply the circuit voltage (phase to phase) by 1.73 and use the resulting voltage value to select the corresponding insulation thickness in the grounded column.

(4) For single or two-phase systems operating at over 5000 volts with center grounded, multiply the circuit voltage (phase to phase) by 0.866 and use the resulting voltage value to select the corresponding insulation thickness in the grounded column.

(5) For single or two-phase systems operating at over 5000 volts with neutral ungrounded, multiply the circuit voltage (phase to phase) by 0.866 and use the resulting voltage value to select the corresponding insulation thickness in the ungrounded column.

(6) For D. C. systems use the insulation thickness corresponding to the respective voltage in the grounded column.

(7) For non-leaded submarine cables, 1/32" shall be added to the specified respective insulation thickness in the table for all sizes and voltages.

(8) The minimum conductor sizes given, are not necessarily suitable for all types of cables or conditions of service. This is especially true for example in the case of submarine cables or long vertical risers where mechanical stresses must be taken into consideration.

(9) Whereas no particular grades of insulation are referred to in the table, it is important to note that Code and Intermediate grades of insulation should not be used for voltages in excess of 5000. As a matter of caution, the manufacturer's recommendations should always be solicited for the proper grade of rubber insulation to be used on all circuits operating in excess of 5000 volts.

Inflating Tires with Water

CONSIDERABLE difficulty has been experienced in the past with farm tractor tires which lost a good deal of their traction power when pulling heavy equipment over rough, uneven ground, due to the bouncing of the tires. One method of overcoming this difficulty was the application of metal weights to the wheels to weight them down, but these constituted inconvenience to the operator as well as the additional expense of the necessary weights. After a series of experiments to determine some practical method of overcoming the bouncing effect engineers of the B. F. Goodrich Company, Akron, have recommended the use of water in the tires.

According to these engineers, use of water provides normal cushioning without rebound or bouncing of the tractors or other equipment, giving the tractor greater tractive ability and better riding qualities. The tire should be filled with liquid until the level reaches the inflation valve and then inflated with air as in ordinary practice. The amount of water should range from 13.80 gallons for the 7.50-24 four-ply size to 53.30 gallons for the 12.75-32 six-ply size. Since many farm tractors are operated in freezing temperatures, Goodrich recommends solutions of commercial calcium chloride, ordinarily used for dust-laying on roads. Ordinary city water pressures of from 30 to 60 pounds are said to be adequate to fill the tires.

Synthetic Rubber in Japan

EVER since the introduction of synthetic rubbers in the United States and Germany, Japanese companies have been conducting consistent experiments to evolve a competing synthetic product. Although several companies have registered trade-names for various forms of artificial rubbers, none of them apparently may properly be termed "synthetic," since the Imperial Invention Association, Tokyo, has recently announced a prize of 10,000 yen to the inventor of a synthetic rubber, the main condition of the award being that the product submitted should contain no natural rubber and that the raw materials for its manufacture be available within the country, according to the Leather and Rubber Division of the Bureau of Foreign and Domestic Commerce.

Research intended to produce a Japanese synthetic rubber has led to the production of Glyside by the Sumitomo Electric Cable Company, described as an artificial rubber, although no technical explanation has been made by the company to date. Aizen, a chlorinated rubber, has come from the laboratories of the Hodogaya Soda Company. Thionite, a polymerized product of ethylene-diglycolide and sodium tetrasulfide, also described as an artificial rubber, is currently being produced by the Furukawa Electric Company, and is said to be used in the cables and other electric supplies featured by the company.

In a recent issue of *Ohm*, leading Japanese electrical journal, Mr. Zen Hayashi, Furukawa engineer, stated that Thionite may be represented by the formula of $(CH_2CH_2S_4)$ N. He admitted, however, that its tensile strength is lower than that of natural rubber.

Crease-Resistant Textiles

IN view of the natural elasticity of rubber, it is not surprising that experiments are continually being conducted with it for the purpose of finding a means of reducing the creasing tendency of cotton and rayon. One such process, developed by the firm of Manchester Dyers, Ltd., of England, makes use of latex and, according to report, results in a cotton material having a springy, crease-resisting character which is practically permanent.

In this process, during which the natural feel and wetting-out properties of the fabric are not affected, impregnation rather than coating is employed, while vulcanization takes place in two separate stages. The cotton goods are treated with latex and squeezed through heavy rolls so that 5 to 10% of latex on the weight of the material is finally taken up. After this the goods are dried by hot air, out of contact with metallic surfaces. Next, the goods are immersed for three and one-half hours in a boiling aqueous dispersion of sulfur and accelerator, as follows:

Colloidal Sulfur ...	24%	on weight of rubber
Zinc Oxide	2%	" " " "
Accelerator	2%	" " " "

The bath contains 10 volumes of water to 1 of fabric. At the expiration of the time period the bath is generally exhausted; the goods are then rinsed, dried and treated in a chamber for 15 to 45 minutes at 115° C. Tests conducted on fabrics made by this process are said to have showed a 92% recovery from creasing in two minutes. Test patterns were folded under a weight and allowed to recover on a frictionless mercury surface.

Use of Stills in Recovering Rubber Solvents

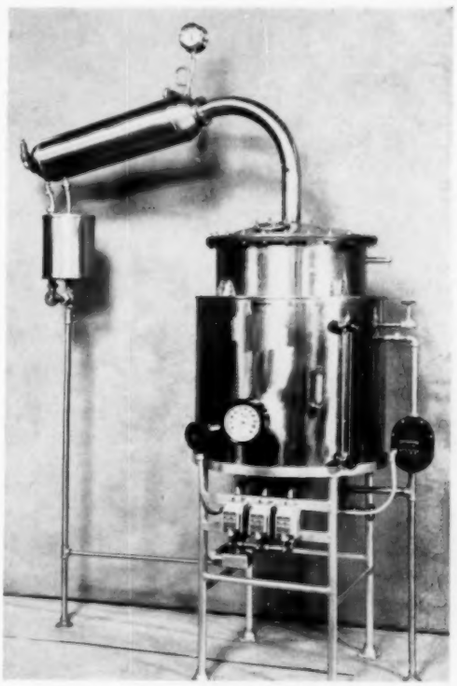
By A. White

Vice-president, Barnstead Still and Sterilizer Co., Inc.

THE rapid growth of the rubber industry in the last ten years has brought with it an enormous increase in the use of rubber solvents. The increasing waste occasioned by throwing away used solvents has forcibly turned many rubber manufacturers' attention toward the problem of recovering these solvents economically.

The problem was two-fold: any satisfactory recovery method had to be efficient enough to reclaim a large portion of the used solvents, and economical enough—in terms of initial and operating costs—to pay for itself in a reasonable time. Both sides of this engineering problem have been successfully solved, as witnessed by the many installations for solvent recovery already in operation. The use of recovery methods, however, is not as widespread as could be wished, and many thousands of dollars that could be saved in this manner are being wasted annually.

Since recovery installations in rubber plants present individual engineering problems, no generalizations can safely be made about the field as a whole. Without attempting, however, to treat specifically certain processes in which solvents are used, we may draw useful conclusions as to the most desirable methods of reclamation.



20 gallons per batch is handled in this electrically-heated, water-jacketed still for low boiling solvents, such as carbon tetrachloride, acetone, ether, etc.

This steam-heated sparge steam still for recovery of high boiling solvents, such as naphtha, kerosene, gasoline, etc., handles 100 gallons per batch.

Solvents are used in the rubber industry almost exclusively to keep rubber in a plastic or dough-like condition until it is applied on the article where its presence is required. The solvent may then be eliminated, since it has served its function. At this point, it may be in a liquid or vaporous state, and each calls for a different method of treatment. A typical case in which the solvent appears in a liquid state after being used is in the mixture of pigments with rubber cements. The rubber, the coloring matter, and as a general rule gasoline, are mixed in large vats to obtain the right consistency. When the cement is removed to be used in impregnating or spreading machines, some of the gasoline remains behind. Because it is contaminated with coloring matter, it is unsuitable for re-use except in a mixture that contains the same color.

This circumstance has led many manufacturers to keep vats of dirty gasoline waiting for a mixture in which they could satisfactorily be used again. Less

costly than throwing away all used gasoline, this method is nevertheless wasteful, and it is here that a simple distillation process can effect savings—even where small quantities of solvents are used.

Another typical case in which recovery can be effectively and economically applied is in cellulosic and other solutions using ethyl acetate, benzol, benzene and solvent naphtha. In vats where these solutions originate, the material often becomes caked on to the sides of the containers, necessitating frequent cleaning and the disposal of dirty solvents. Even though the amount used at one time may be small, the savings made by accumulating dirty solvents in a storage tank over a period of time can be large.

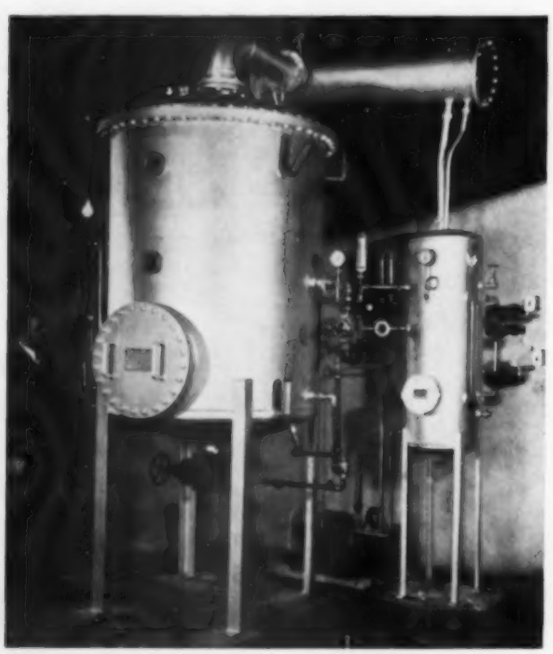
The choice of a still for these purposes should be dictated by the kind of solvent to be recovered, quantity, and the desired purity of the distillate, the rate at which it is to be recovered, and the heating medium available at the point of installation.

Additional Recovery Possibilities

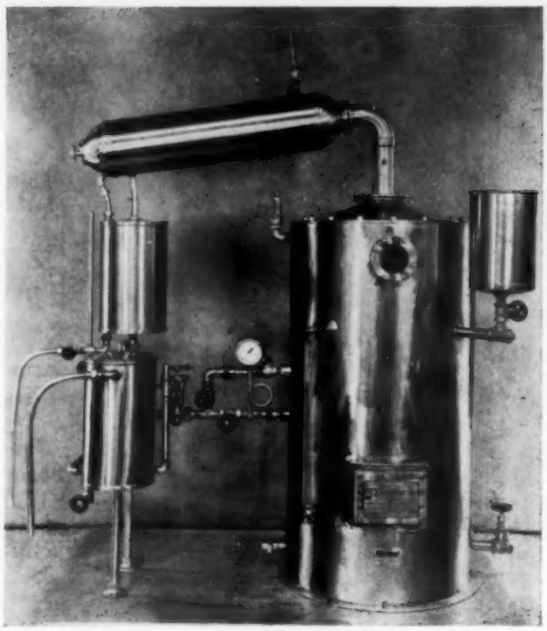
If we have exhausted possibilities of solvent recovery up to the point where cements or doughs are delivered to impregnating or spreading machines, there remain further important possibilities of recovering the vapors. The universal procedure of removing solvents at this point consists of either natural or forced evaporation. The initial cost of installations to recover these vapors is necessarily an important factor in the problem, but it is expected that more and more effort will be made to reduce the wasteful practice of dissipating these vapors in the air.

One fairly simple method of vapor recovery is to condense the vapors by cooling coils, thereby obtaining solvent of sufficient purity for re-use. This method has the advantage that the equipment is comparatively low in first cost, but it has two serious handicaps. It is inefficient; but more important than that, it solves the hazard of explosion.

A widely used solvent vapor recovery method that has been found completely satisfactory in a large number of plants is the oil absorption process. It has the advantage that the concentration of vapors may be kept within safe limits well below the explosive point without seriously affecting the efficiency of recovery. One plant using this method reports 80% recovery at a concentration of about 1%.



A continuously operating and completely automatic steam-heated vacuum type still for high boiling solvents which distills 100 gallons per hour.



Steam-heated combination sparge and atmospheric pressure still for both high and low boiling solvents, handling 50 gallons per batch.

Another method used for gasoline vapor recovery is adsorption of the vapors on activated charcoal with subsequent stripping of the recovered gasoline from the adsorbent by steam.

Having outlined the more general applications of solvent recovery in the rubber field, it may be well to pass briefly over the types of solvent recovery stills available. Four different types of stills have been developed to meet the requirements of different kinds of solvents. The atmospheric still will reclaim practically any kind of a low boiling solvent without difficulty. A sparge type live steam still is best suited for high boiling solvents, and if steam is not easily available, a vacuum still can be used. For manufacturing plants using large quantities of both high and low boiling solvents, a combination type steam-operated still can be provided. While quite different in operating principles, these stills are simple and require a minimum of attention.

In the atmospheric type still the solvent is fed to the evaporator, the level of the solvent may be checked with a glass gauge to prevent its becoming too high. The solvent vapors pass into the condenser coming out clean and cool, ready to be used again.

Automatic shut-offs may also be furnished to stop the operation of the still when the batch has been completed. The device is simple, involving the action of a thermostatic switch, shutting off the heat when the residue has reached a predetermined high temperature or low level.

A sparge type still operates in a slightly different manner. The dirty solvent is heated for approximately twenty minutes by an enclosed steam coil, following which steam is passed into the bottom of the evaporator. This open steam carries the solvent vapors into the condenser at a rate specified where

both steam and solvent vapors are condensed. The distillate is cooled and delivered to a separator, where the reclaimed solvent is separated from the water by gravity.

Too infrequent draining of the evaporator is common cause of foaming, which results in contaminating the distillate. Also an excessive rate of open or sparge steam will carry oil and other impurities into the evaporator. In either case, the steam can be throttled by the operator until the boiling liquid level is below the proper point in the evaporator as indicated by a sight glass. If moisture appears in the distillate, giving it a cloudy appearance, a loose cotton towelling inserted in the top of the separator will quickly eliminate the difficulty.

Vacuum type stills for high boiling solvents have often been found even more economical in operation than the sparge type. The solvent in this case is drawn into the evaporator through a float valve which automatically maintains the desired level. Vaporized by steam delivered to the evaporator, the solvent is distilled under reduced pressure. The vacuum type has the advantage of great economy. Where a wide variety of solvents are used in one plant, combination type stills can be furnished to recover high or low boiling solvents either by direct distillation or by the open sparge process.

If stills are to give perfect service, proper care, cleaning and flushing are most important. In all types of stills, the foreign matter remaining in the bottom of the evaporator must not be allowed to accumulate. If a small quantity of solvent is left with the residue, it will be easy to flush out. An undesirable amount of residue can be detected by excessive foaming, the temperature of the residue, or decreased capacity. From time to time, the still may be taken down to permit thorough cleaning by a plant operator.

Modern stills are designed for economy of performance and ease of operation and cleaning. The necessary control valves can be easily operated by any helper in a plant, and when the still is equipped with automatic controls the operator has only to start it.

In the light of low operating costs and the large potential savings on solvents in this field, it is predicted that many rubber plants at present throwing dirty solvents away, will invest in recovery installation.

Rubber Seed as a By-Product

SOME interest has been shown from time to time by Netherland Indian agricultural authorities and planters in the possibilities of rubber seed as a profitable by-product of the most important product in the Netherlands Indies. At the same time, not only is there a complete lack of reports concerning production of this seed, but little information is available concerning the experiments which have been made with the seed. Export statistics show no exports, but exporters say that occasional small shipments are made.

That the seed of the rubber tree falls on the ground when ripe, and that harvesting consists only in gathering the fallen seeds, has of course always been a matter of general knowledge. Nevertheless, the great importance of rubber itself assumed ever since the beginning of its cultivation on a systematic scale overshadowed any possibilities which the seed might have had, according to the few who have ever discussed the rubber seed question. The most complete discussion that appears to be available is in K. Heyne's survey of Netherlands Indian plants, published in 1917, which contains (after a discussion of rubber) a paragraph on the rubber seed, of which the following is a summarized translation:

"It (the rubber seed) contains a light-yellow oil, the number of seeds necessary to produce one ton of rubber-seed oil amounts to between 500,000 and 1,000,000, while between 400 and 850 seeds can be obtained from each rubber tree. The seeds consist of 51% shell and 49% kernel. The shells are worthless, except as a fuel, but the kernels contain a good percentage of oil. The recent experiment showed that the first pressing resulted in an oil yield of 22.5% of the weight of the kernel, the second pressing gave an 8.5% oil yield, and the third pressing 6.5%. The seed therefore was shown to have a total oil yield of 37.5% good oil, with little difference in quality shown between the products of the three pressings.

"The oil contained . . . about 4.9% free fatty acids. The oils would be a good substitute for linseed oil in those industries which use a cheaper quality of linseed oil; that is, it could very well be used in the manufacture of linoleum and cheap paints. For the very reason that it corresponds with second quality linseed oil, it would probably have to be marketed at not more than two-thirds the price of good quality linseed oil."

The experiments referred to showed the following concerning the properties of rubber-seed oil:

	Average figures
Specific gravity at 30°C.	0.918
Iodine number	127.000
Saponification number	192.000

There follows some discussion raising considerable doubt as to whether rubber-seed oil could be produced at such a cost that it could profitably be marketed at less than the price of competitive oils, like linseed oil. According to some further figures which are quoted, the cost of gathering the seeds is approximately f.0.03 a thousand, while it is stated previously that between 500,000 and 1,000,000 seeds are needed to yield one metric ton of the oil. This would place the cost price per ton for the harvesting and gathering only at between f.15 and f.30. This cost would therefore of course not include the cost of pressing and other necessary operations.

It is admitted, however, that the collecting of the seeds is much more difficult on rubber plantations where undergrowth is permitted to surround the trees —and this is understood to be the usual practice on plantations nowadays. Moreover the seed is said to act as a natural fertilizer around the trees and planters are not anxious to see it gathered up.

In any case, rubber-seed oil is not at present being produced in the Netherlands Indies and the whole matter of its possibilities is still in the experimental stage. The tremendous potential production of this oil in this country is obvious since rubber is the chief product of the Netherlands Indies.

(This report was submitted by Edward A. Dow, Jr., Clerk to Trade Commissioner, Batavia, N.E.I., Office of the Department of Commerce.—EDITOR).

The Gulf Marsh Buggy

Special Conveyance for Navigating Swamp Lands in the Search for Oil Uses Tires 10 Feet High by 3 Feet Wide

THE transportation of geophysical crews and equipment into the seldom penetrated swamps of Louisiana and other states in the constant search for oil-bearing strata has long presented a problem, one which apparently has been overcome by the construction of a unique conveyance representing a merger of automobile, tractor and boat which uses the largest tires ever molded. Built under specifications supplied by the Gulf Oil Corporation, Pittsburgh, the "contraption" has been termed the Gulf Marsh Buggy. It cannot be classified as a motor car, tractor or boat, in reality being a combination of all three since it is equally at home on land, in waist-deep mire, or in water deep enough to float an ocean liner. In any event, it has proved itself capable of squiring both crews and equipment in hitherto almost inaccessible swamp lands.

The 7,500 pound vehicle has an overall length of 22½ feet and is powered by a Ford V-8 engine equipped with an oversized cooling system. At the rear of the motor is a regular passenger car transmission coupled in series with a McCormick Deering tractor gear box. The tractor transmission is fastened rigidly to the frame and the rear wheels are mounted on the ends of extended axles. The combination of the two transmissions permits ten forward and six reverse speeds.

The front wheels receive their power from chains that pass over sprockets on the back axles. This gives a differential action between the wheels on either side but not between the front and rear. The tractor transmission is provided with two brakes, one to control the wheels on the right, the other to act upon those on the left. Thus, when operated in water, the huge machine can be propelled by all four wheels or by the two on either side.

The forward axle is of conventional design with regular toe-in and caster action and the steering mechanism is similar to that of a motor car. The axle is pivoted in the center in such a manner that either front wheel can rise two feet above its mate without distorting the frame.

The tires of the Gulf Marsh Buggy were designed and fabricated by the Goodyear Tire and Rubber Company and are the largest ever molded. They are 10 feet high by approximately 3 feet wide and are mounted on 66 inch rims. The displacement of the balloons is so great that the monstrous vehicle floats with an immersion of less than two feet.

If one of the tires becomes punctured constant pressure can be maintained by starting a compressor which feeds air into the tube. The compressor's output is sufficient to keep the balloons fully inflated until the buggy can be returned to the base of operations where the leaky tube can be repaired or replaced. The air pressure in the tires never exceeds six pounds per square inch and the buggy's weight is amply supported with only one pound per square inch pressure in the casings.

In water or in the marshes traction is obtained by attaching twelve treads to each wheel. These were made from two-inch rubber hose sealed at the ends and provided with an air valve through which they are inflated to a pressure of 25 pounds per square inch. Inflation is necessary to keep the links from flattening out under the weight of the monstrous vehicle.

In order that strength would not be sacrificed for

(Continued on page 296)

The tires on the Gulf Marsh Buggy, seen in action on the left, are 10 feet high by 3 feet wide and are mounted on 66 inch rims. They are the largest tires ever molded and were produced by Goodyear. Rubber treads, made from 2-inch hose, make traction possible in water or in marshes.

Swelling and Solvation of Rubber in Different Solvents

By Ira Williams

E. I. du Pont de Nemours & Co., Inc.

TWO principal explanations for the high viscosity of rubber sols have been advanced. Staudinger and co-workers (*14*) believe that rubber consists of extremely long, stiff, and extended molecules which, even in low concentration, interfere with one another during flow because of the large space required for the rotation of a single molecule. They recognize that a fiber molecule can be solvated (*15, 17*) but do not believe that the viscosity depends primarily on solvation (*18*). This explanation for the high viscosity of rubber solutions has been widely accepted since its introduction. Other investigators (*1, 3, 4, 8, 10, 12*) believe that rubber is micellar and probably solvated when dispersed in solvents. The solvated unit is usually considered to consist of a number of molecules more or less loosely bound into a group which becomes greatly swollen and in this manner removes a great portion of the liquid as an effective dispersing medium. According to Meyer and Mark, 1 gram of rubber in 100 cc. of benzene would imbibe solvent to produce a system containing 20 to 40 grams of solvated rubber in 80 to 60 cc. of free benzene. Hatschek believes the swollen units to be more or less mobile and easily deformed so that flow takes place in high concentration only by distortion of the solvated unit.

A close relation between the viscosity of rubber sols in various types of solvent and the swelling of rubber produced by the same solvents would indicate a micellar structure for rubber sols. The process of imbibition which involves forces small enough so that slight changes in the system (such as cooling) will often produce syneresis, could be expected to immobilize a considerable amount of liquid. The effect of this immobilization on viscosity would be that caused by both a decrease in the volume of solvent and an increase in the effective volume of dispersed material. Although a single molecule would not be expected to swell, it might immobilize a certain quantity of solvent by association. The viscosity of a molecular solution of low concentration of most materials is, however, usually little greater than the viscosity of the solvent.

Different solvents have been shown by Van Rossem (*19*), Kawamura and Tanaka (*5*), Sakurada and Tanaka (*11*), and Philippoff (*9*) to produce sols of different viscosity. Kirchhof (*6*) noticed the difference in solvent power of benzene, gasoline, carbon tetrachloride, and various chlorinated acetylenes and also pointed out the parallel between swelling and solvent action. Hatschek noted from the data of Kirchhof that a relation existed between swelling power and relative viscosity. Kitsuta (*7*) presented data which showed a large variation in the relative viscosity of rubber sols produced with carbon disulfide, benzene, chloroform, carbon tetrachloride and trichloro- and tetrachloroethane. The difference in viscosity of rubber sols in the common solvents such as benzene and gasoline is small.

This paper was presented at the meeting of the Rubber Division, A.C.S., held in Pittsburgh, September 10-11, and is reprinted from the February, 1937, issue of *Industrial and Engineering Chemistry*.

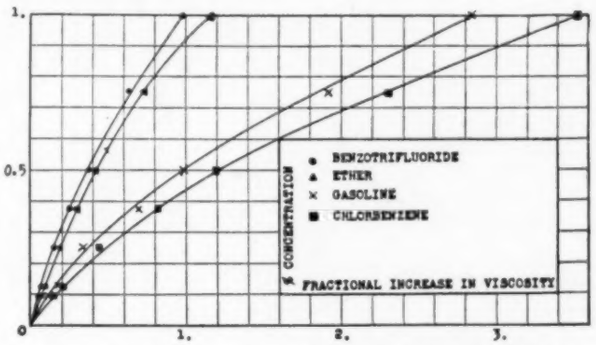


FIG. 1—Fractional Increases in Viscosity of Rubber Solutions.

Variation in Viscosity

The fractional increase in viscosity produced by rubber in a number of solvents has been found to vary within wide limits:

Pale crepe rubber was milled for 10 minutes on a warm mill to ensure solubility and uniformity of the sample. Ten grams of this rubber were made up to 500 cc. with solvent and shaken until dispersed. The solution stood for 6 to 10 days before being used. Lower concentrations of rubber were obtained by diluting portions of this 2 per cent cement, and in each case the diluted sample stood from 18 to 24 hours before being tested. The relative viscosity was determined at 30° ± 0.1°C. in an Ostwald type viscometer which flowed a volume of 7.2 cc. through a capillary 0.716 mm. in diameter and 4.5 cm. long under a mean head of 9.9 cm. of solution. All solvents and solutions were handled in clear glass in diffused daylight and no attempt was made to protect the material from oxygen.

The solvents were selected to represent a range from nonpolar to strongly polar types. In certain cases, such as nitrobenzene, a solution could not be prepared directly but the effect of the solvent was obtained by dilution of a more concentrated benzene sol. Benzotrifluoride was included because of the great similarity in the directing influence of the nitro and trifluoromethyl groups. Menthol was included because of the interest created by Pummerer and others in the determination of the molecular weight of rubber in this solvent. In order to avoid the excessive heating required to pro-

mote solution in menthol, a solution in mixed solvents was obtained by diluting a more concentrated benzene sol with menthol.

The time of flow is shown in Table I to differ considerably for each solvent and solution. The variation in viscosity of sols of low concentration is almost in proportion to the variation between the solvents. The same general tendency is shown at the highest concentration, but chlorobenzene and dibutylamine fall somewhat out of line.

TABLE I. TIME OF FLOW OF RUBBER SOLUTIONS AT 30° C.

	Grams Rubber per 100 Cc. Soln.:							
	0	0.095	0.125	0.25	0.375	0.5	0.75	1.0	2.0
Solvent	*Time of flow, seconds*								
Chlorobenzene	71.1	81.7	85.8	102.6	129.6	156.8	235.0	321.7	944
Benzene	70.6	81.7	84.7	103.8	128.9	153.7	224.5	294.5	876
Gasoline	79.1	88.2	93.4	106.0	134.6	157.5	230.4	303.5	891
Dibutylamine	104.3	117.2	120.5	138.6	161.2	187.5	247.2	315.2	762
Amyl chloride	63.3	67.4	69.0	76.4	89.7	95.6	135.2	172.7	490
Caproic acid	292.0	307.5	326.5	349.1	393.1	430.0	535.5	651	1334
Ether	44.4	47.1	48.1	52.3	57.9	62.5	76.8	96.0	231.7
Benzotrifluoride	53.7	56.7	57.4	61.7	66.8	73.5	87.6	106.7	247.8
1 vol. benzene plus:									
2 vol. nitrobenzene	102.1	106.7	108 0	112.0	125.6	130.9	165.2	200.5	443.7
4 vol. menthol	513.6	...	...	695	...	...	1257	...	3917

TABLE II. FRACTIONAL INCREASE IN VISCOSITY OF RUBBER SOLUTIONS

	Viscosity of Solvent	Grams Rubber per 100 Cc. Soln.:							
		0.095	0.125	0.25	0.375	0.5	0.75	1.0	2.0
Solvent	*Sec.*	Fractional increase in viscosity							
Chlorobenzene	71.1	0.15	0.21	0.44	0.82	1.20	2.30	3.52	12.27
Benzene	70.6	0.16	0.20	0.47	0.82	1.18	2.17	3.17	11.41
Gasoline	79.1	0.12	0.18	0.34	0.70	0.99	1.92	2.84	10.25
Dibutylamine	104.3	0.12	0.15	0.33	0.54	0.80	1.37	2.02	6.29
Amyl chloride	63.3	0.06	0.09	0.20	0.42	0.51	1.12	1.72	6.74
Caproic acid	292.0	0.05	0.12	0.20	0.35	0.47	0.83	1.23	3.60
Ether	44.4	0.06	0.08	0.18	0.30	0.41	0.73	1.16	4.21
Benzotrifluoride	53.7	0.05	0.07	0.15	0.25	0.37	0.63	0.98	3.61
1 vol. benzene plus:									
2 vol. nitrobenzene	102.1	0.044	0.06	0.10	0.23	0.28	0.62	0.96	3.34
4 vol. menthol	513.6		..	0.35	..	..	1.45	.	6.62

The fractional increase in viscosity [(*T* solution / *T* solvent) — 1], which at any fixed low concentration should, according to the formula of Staudinger (*16*), be proportional to the molecular weight or chain length of the rubber molecule is shown in Table II and Figure 1. These data show that the fractional increase in viscosity decreases continually with decreasing concentration and at no low concentrations do the values approach constancy. The value obviously becomes zero at zero concentration. These data agree with the findings of Zhukov, Komarov, and Gribova (*21*) for sodium butadiene rubber, sodium isoprene rubber, and chloroprene polymer. The fractional increase in viscosity at any fixed concentration varies with the nature of the solvent. This is in contrast to the statement of Staudinger (*13*) that the solvent is without significant influence. Such results show that the effective size of the dispersed rubber particle, whether molecular or micellar, is not constant in all dilute solutions but is different in each solvent. If the fractional increase in viscosity is caused directly by unsolvated molecules, then certain solvents must bring about a decrease in molecular size of the rubber. This appears unlikely when chemically inactive solvents are used.

In Table II the fractional increase in viscosity bears no relation to the viscosity of the solvent. If the increase in viscosity is due only to the length of a rigid filiform molecule, the percentage increase should either be uniform in all solvents or vary as some function of the viscosity of the solvent. Since no relation is obvious between the increase in viscosity and the viscosity of the solvent, it must be concluded that the viscosity is controlled by some factor other than the size and shape of the rubber molecule.

The fractional increase in viscosity according to the formula of Staudinger is directly proportional to the molecular weight when a fixed low concentration is considered. When applied to this formula, the data in Table II indicate that the molecular weight of the same rubber varies as much as 300 per cent under the influence of different solvents.

Rubber is not degraded after being dissolved in a solvent which produces a low viscosity. After removing the solvent it is possible to replace it with another and thus obtain a viscosity characteristic of the second solvent. This process can be repeated a number of times if the rubber is protected from oxidation.

Two grams of milled pale crepe rubber were made up to 100 cc. with solvent in a distilling flask and shaken until the solution was homogeneous. Milled rubber was used because the viscosity of its solutions is less influenced by subsequent oxidation. The viscosity was determined at 30° C. after standing for 24 hours and the contents of the viscometer were then rinsed into the distilling flask with pure solvent. The solvent was removed from the rubber by heating to a final temperature of 45° to 50° C. under a pressure of 1 mm. An equal volume of the second solvent was then added to the flask which was flushed with nitrogen and shaken to promote solution. This process was repeated with each solvent. The results of such tests are shown in Table III and indicate that rubber is not changed in any manner by being brought into solution but reaches a definite equilibrium with each solvent.

Variation in Swelling

Swelling tests were made on both vulcanized and unvulcanized rubber.

Smoked sheet rubber containing 10 per cent sulfur was vulcanized for 60 minutes at 145° C. Strips of rubber 1 mm. square and 2 cm. long were cut from the center of the vulcanized slab in a manner which eliminated the surface of the rubber that had been in contact with the mold. Similar strips were prepared from unmilled smoked sheets and from a sheet prepared by the evaporation of a latex which had been concentrated by centrifuging. The strips were placed in glass tubes with 10 cc. of the solvent, and the length

TABLE III. VISCOSITY CHANGES CAUSED BY REPLACING ONE SOLVENT WITH ANOTHER

Order	Solvents	Viscosity	Solvents	Viscosity
		Sec.		*Sec.*
Original	Ether	212	Benzotrifluoride	245
2	Benzene	715	Chlorobenzene	836
3	Ether	231	Benzotrifluoride	222
4	Benzene	730	Chlorobenzene	798

TABLE IV. SWELLING POWER AND VISCOSITY

	2% Solution		Vol. of 1 Cc. at Max. Swelling, Cc.		
Solvent	Viscosity, seconds	Fractional increase in viscosity	Evaporated latex	Sheets	Vulcanized rubber
Chlorobenzene	944	12.27	37	28	9.8
Benzene	876	11.41	30	13	8.4
Gasoline	891	10.25	33	10	5.4
Dibutylamine	762	6.29	21	9	8.0
Ether	232	4.21	14	4	3.9
Caproic acid	1334	3.60	10	8	4.1
Benzotrifluoride	248	3.61	8	7	3.1

was followed by measuring through the glass. Equilibrium was reached more rapidly with the less viscous solvents but in all cases it was essentially complete in 24 hours. The length was somewhat difficult to determine accurately with the unvulcanized rubber, especially in benzene and chlorobenzene. The portion

of the rubber which diffused into the solvent undoubtedly influenced the final length both by loss of rubber and by reducing the swelling maximum due to the presence of dissolved rubber as shown by Blow and Stamberger (*2*). In most cases the edges of the strips were well defined after 24 hours, when the final readings were made. The measurements are sufficiently accurate to determine differences in swelling in a roughly quantitative manner. Volume swelling was calculated on the assumption that the swelling was equal in each dimension.

The results of these measurements are shown in Table IV compared with the viscosity data for the 2 per cent solution from Tables I and II. The data agree in general with the observation of Kirchhof (*6*) and Hatschek (*3*) that the best swelling agent produces a solution of the greatest viscosity. Although the actual viscosity depends on the viscosity of the solvent, the fractional increase in viscosity shows a close parallel with the swelling power of the same solvent for either vulcanized or unvulcanized rubber. Dibutylamine has an abnormal swelling action on vulcanized rubber in accord with the known effect of accelerators on rubber containing combined sulfur (*20*).

The swelling of rubber depends to a great extent on the state of oxidation of the rubber. Gel rubber will swell but does not readily dissolve in benzene in the absence of oxygen.[1] The oxidation of rubber during milling reduces the swelling required to detach the final swollen unit of rubber and, by creating more points of cleavage, causes a decrease in the size of the resulting micelle. Rubber which has been milled sufficiently appears to dissolve from the surface with little swelling.

The difference in swelling power of liquids and the relation between swelling and viscosity is not confined to rubber sols. Solutions of chloroprene polymer have been found to act in a similar manner. The fractional increase in viscosity is, however, considerably smaller than that for rubber, being 2.39, 1.74, and 1.18 for a 2 per cent solution of chloroprene polymer in benzene, amyl chloride, and dibutylamine, respectively. The polymer was not soluble in ether or benzotrifluoride.

Conclusions

The large variation of the fractional increase in viscosity of rubber sols and its lack of relation to the viscosity of the solvent indicates that the increase in viscosity is not due to rigid filiform molecules.

The ability to interchange solvents and obtain a viscosity characteristic of the solvent shows the existence of a reversible equilibrium between solvent and rubber.

The close relation between the maximum swelling and the fractional increase in viscosity of rubber in different solvents suggests that rubber sols contain swollen micelles of rubber. The extent of swelling and the viscosity depend on the equilibrium between solvent and rubber which, in turn, depends on the state of oxidation (or other suitable chemical attack) of the rubber.

A rubber sol becomes a gel at the concentration which immobilizes essentially all the solvent.

The relative viscosity of rubber sols of equal concentration in the same solvent is probably some function of the degree of solvation of the dispersed particles which is influenced by the degree of oxidation of the rubber. Viscosity is not a measure of the molecular weight.

[1] The sample of gel rubber in an evacuated tube with benzene is described in *Ind. Eng. Chem.*, **27**, 1317-21 (1935) and *Rubber Chem. Tech.*, **9**, 342 (1936). The rubber shown in Figure 1 has been kept in diffused light at room temperature for one year without the formation of a smooth solution.

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Rubber and Felt

ONE disadvantage of lower grades of felts is in the loss of fibers from their surfaces when subjected to vibration. These linted fibers, if used next to fine mechanism, tend to cause clogging of the mechanism. By coating these surfaces with a continuous film of latex, this disadvantage has been overcome, according to a review of rubber and felt developments in the November 30th, 1936, issue of *American Dyestuff Reporter*.

Latex has been found of advantage in lending proper flexibility to sizing mixtures, besides improving their water resistance, while in turn felt has been found to be a good strengthening agent for rubber. Greater tensile strengths are reported to have been discovered in gaskets in which felt is employed as a base for rubber compounds than in gaskets made from rubber compounds alone. It is pointed out that in a rubber-felt gasket, should the rubber start to disintegrate because of aging there remains the reinforcing felt to further the life of the gasket.

One of the major outlets for felt, the article continues, is in the automotive and mechanical industries. The introduction of leather sealing mediums which possessed greater efficiency pushed felt products aside in many instances. The rapid development of synthetic rubbers, however, has enabled the felt industry to offer a new oil sealing medium not only to the automotive industry but also to any industry where the passage of oil from one part of a shaft or mechanism to another must be checked. This medium is obtained by superimposing layers of felt and synthetic rubbers, the latter being especially resistant to oils.

In certain forms, such as powder, the synthetic rubbers are merged with felt in another manner. They are spread upon a felt surface and subjected to heat, quickly becoming plastic.

The Gulf Marsh Buggy

(Continued from page 292)

lightness considerable aluminum alloys were used in the construction of the conveyance. The main frame is an ordinary automobile chassis to which aluminum alloy extensions have been added. The sides of the chassis and the platform upon which the men and equipment are carried also are constructed of this metal. The large aluminum wheels are shaped like huge drums and contain sufficient air to keep the machine afloat even with all four tires completely deflated.

As the Gulf Marsh Buggy frequently operates on inland waterways, it carries a marine license and is equipped with all the requirements for Class 1 power boats. The white light, which must be visible over the entire horizon, is mounted on a mast at the rear of the buggy slightly above the top of the tires. The forward red and green lights, required by marine law to be visible for 180 degrees, are fastened to a short bowsprit that may be folded against the prow when not in use. Located directly in front of the operator is a vertical panel. On one side of this is an automobile horn and a pair of powerful headlights. On the driver's side is a box containing oil and air pressure gauges, compass, ignition switch, and water temperature indicator. Fastened to the operator's seat is a small fire extinguisher and a brass box containing marine regulations and a book of operating rules.

Platform Required for Visibility

Higher than the operator's head is a small platform at the rear, used on location as a stand for surveying instruments. At times, while traveling through the marshes, one of the passengers is stationed here to direct the driver whose vision frequently is obstructed by the marsh grass which often grows over 12 feet high.

The Gulf Marsh Buggy can be operated over smooth ground at a speed of 35 miles an hour and is capable of navigating the marshes at between 10 and 12 miles an hour. In water the speed is slightly in excess of six knots. When traveling over rough ground the huge tires act as cushions; consequently the crew and their equipment are not jolted severely.

For centuries transportation through the marshes has been possible only by shallow draft boats or by foot, and neither of these permitted the carrying of equipment so essential to the scientist searching for oil-bearing strata. With the development of the Marsh Buggy, however, the picture has changed and Gulf field crews now are able to navigate the swamps with ease. Through the use of this strange machine oil will be discovered in many out-of-the-way places and pipe lines hurriedly will be laid to modern refineries where the crude will be converted into many of the petroleum products essential to twentieth century civilization.

Rubber Under Fender Coating

A SPECIAL under-fender coating, manufactured from a compounded rubber base, is being supplied to automobile dealers through the cooperation of their respective automobile suppliers. The coating protects the under-fender finish from chipping caused by gravel, stones, etc., thrown by the tires. Once this finish has been chipped the solutions used by many municipalities on roads and streets, such as calcium chloride which is used in the Summer months to eliminate dust, and in the Winter months to melt snow and ice, tend to rust the fenders.

In addition, this special coating is said to deaden noise effectively. It is applied to clean metal or Duco after mud, rust or corrosion has been removed. It may be brushed or sprayed and should be applied at least in thicknesses of 1/16th to ⅛th of an inch, and allowed to dry for three hours or more. One gallon covers approximately 35 square feet. This new rubber base coating was developed by the Inland Manufacturing Company, Dayton, Ohio, and is claimed by the manufacturer to be superior to similar materials due to its resilience, adhesion and longer life.

Pilchard Oil in Rubber

SOLID saturated fatty acids can be produced from whole pilchard oil or from stearine resulting as a by-product in the cold-clearing process, and utilized as an activator in rubber compounding, according to tests conducted by H. N. Brocklesby of the Pacific Fisheries Experimental Station, the results of which are contained in Progress Report No. 28, issued by the Biological Board of Canada.

The solid form is obtained by giving the oil a mild alkali refinement, after which it is hydrogenated to the required degree of saturation, i. e., iodine value less than 10. The hardened fat is then saponified either by alkali or acid hydrolysis and the solid fatty acids are melted, separated and chilled. Bleaching of the acids is not generally necessary, according to Mr. Brocklesby, as the product is fairly white. Further treatment is purely mechanical, depending upon the form in which the acids are to be marketed, the rubber industry preferring the flaked or beaded forms.

In recent years the rubber industry has practically standardized on single pressed stearic acid, the usual criteria by which its suitability is judged including melting point and degree of unsaturation. A typical laboratory specification follows: melting point (minimum), 52° C.; saponification value, 208-212; acid value, 207-210; iodine value (maximum), 10-12. One sample of hydrogenated acid from refined pilchard oil, prepared by Mr. Brocklesby and tested by the National Research Laboratories in Ottawa, showed the following analytical characteristics: titer, 52.9° C.; saponification value, 205.5; acid value, 196.8; and iodine value, 2.7. This compound, according to the laboratories, is "the one most likely to find acceptance by the rubber industry."

Former Rubber Outings

WITH this issue THE RUBBER AGE concludes the presentation of a series of photographs of outings and picnics held by various rubber organizations two and three decades ago. The first of the series appeared in the August, 1936, issue. On the opposite page is a panoramic view of the group which attended an outing of the Rubber Club of America at the Vesper Country Club, Lowell, Massachusetts, on July 18, 1916. For purposes of reproduction, this view was cut apart and appears in two sections. Observation will reveal that the right end of the upper view is duplicated on the left end of the lower one. Many of the individuals appearing in this reproduction are still actively engaged in the rubber industry. How many of them can you recognize?

Rubber Outings of the "Good Old Days"

(See lower right hand column on the opposite page for details of this outing)

New Equipment

Sta-Warm Electric Heaters

DEVELOPED in conjunction with the engineering department of the B. F. Goodrich Company, the Sta-Warm porcelain lined electric heater, especially designed for use in connection with Koroseal compounds, has been introduced by the Sta-Warm Electric Company, Ravenna, Ohio. Korogel and Korolac, both derived from a Koroseal base, must be melted and heated uniformly under close temperature control in a porcelain enameled container. Korogel is the molding gel, while Korolac is primarily used as a rack coating for electro-plating. The heating unit in the Sta-Warm heater is cemented and baked to the outer

wall and bottom of the container, thus giving an even distribution of heat from all sides. The temperature is controlled by a variable control thermostat which holds the temperature of the material at the desired setting, the material remaining at this temperature as long as the heater is connected to the line. Complete operation entails pre-heating by steam in other equipment to 300° F., after which the material is placed in the Sta-Warm heater and is carried up to 525° F. The special heaters are built in any size for practically any capacity or shape, with glass or porcelain lining to suit specifications.

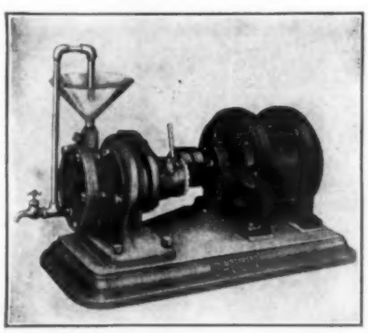
Thwing-Albert pH Meter

TWO models of a new type of portable pH meter, especially designed to simplify the taking of pH measurements, have been developed by the Thwing-Albert Instrument Company, Philadelphia. Model 1 is described as a simple potentiometric circuit with quinhydrone or antimony electrodes or both, and Model 2 as a vacuum tube type with quinhydrone, antimony or glass electrodes, said to operate equally well on all three. Model 1 has been designed so that it may be easily converted to Model 2 at any time. Both models are direct reading in pH and are constructed in such a manner that any non-technical person can learn to use them successfully in a short time, according to the manufacturer. The operation of either instrument is entirely independent of color, turbidity or suspended matter in solutions. They are especially adapted to potentiometric titrations which provide for

the making up of solutions to a definite pH. Applicable over a wide range, the instruments are compact, come complete with electrodes, and are guaranteed accurate to .05 pH or 3 M.V. Model 1 is illustrated herewith.

Gaulin Laboratory Colloid Mill

FEATURING several new developments, the Gaulin Laboratory Colloid Mill is being distributed by the Laboratory Equipment Company, 146 Lafayette Street, New York City. Suitable for latex dispersions, the new laboratory mill is said to prevent separation and creaming of certain emulsions, to give smoother and smaller particle size emulsions, take samples as small as four ounces and on free flowing emulsions has an output of approximately 15 gallons an hour. Features claimed follow: an adjustable gap permits adjustments to be made while the mill is in operation; water cooling system prevents overheating and decomposition, although hot water may be used in the jacket of the mill when emulsions of materials having



high temperatures are being made; non-foaming, made possible by a new air-release on the grinding chamber, with oxidation, fluffiness, and unstable emulsions eliminated; and a non-seizing rotor. Milling chamber, rotor and stator faces, and all parts in contact with material to be treated are made from stainless steel and bronze, although other metals may be substituted, according to the company.

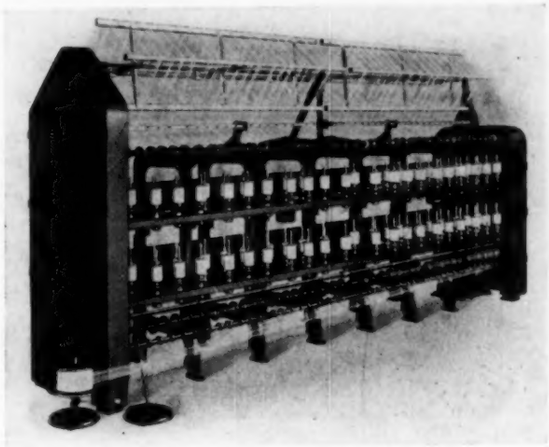
Federal Hardness Testing Gauge

KNOWN as Model 1122, a new hardness testing gauge, especially designed for use in the rubber industry, although applicable for testing cork, felt compositions and other similar materials, has been brought out by the Federal Products Corporation, Providence, Rhode Island. The gauge is designed so that a true determination of the amount of penetration is obtained. One of its principal features is that the irregular surface of a sample is first pressed down under a known weight and the platen locked into position; then the penetrometer point is allowed to settle

into the rubber under a known constant weight and the penetration read (after a certain lapse of time) on the indicator. The levers operate automatically and the instrument can be maintained in such a manner that intermittent tests can be made of a sheet of rubber as it is being run off. The total weight on the penetrator point is approximately 3 pounds, the diameter of the penetrator is 5/32nd-inch, diameter of lower anvil is 2 inches and the maximum thickness of sample is 1 inch. The entire instrument is chrome-plated so that it may be easily cleaned of soapstone and talc.

Rubber Covering Machine

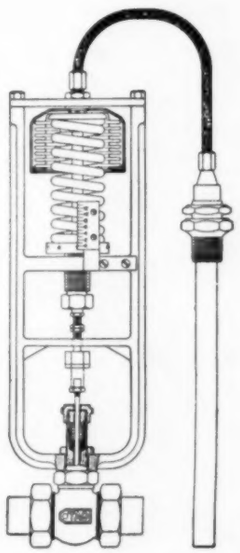
MANUFACTURERS who buy rubber thread and cover it themselves will be interested in a new covering machine introduced by the H. & B. American Machine Company, Pawtucket, Rhode Island. The machine handles any size of rubber thread, runs at any spindle speed up to 10,000 r. p. m., wraps any number of turns per inch within practical limits, and permits any elongation desired within the limits of the raw material. It operates in the following manner: each rubber thread, delivering from the main spool or beam supply, is wrapped twice around the draw-off wheel and then carried up through a double deck of spindles; the lower spindle (which usually runs about 30% faster than the upper spindle) covers the thread with a clockwise lay of yarn, the upper spindle covering it with a counter clockwise lay; from this point the thread delivers around the take-off wheel (2 wraps) and on to the reel in skein form. Wraps per inch of the covering yarn varies with the size of the yarn itself and with the type of goods desired. For instance, according to the manufacturer, in producing some of the higher grades of cloth a 112 rubber with a 50/1 one end wrapping yarn may be used, 75 to 80 turns per inch on the bottom deck and 100/1 two end wrapping yarn, 50 to 55 turns per



inch on the top deck, the elongation being from 95 to 105%. Production varies in accordance with the size of the thread.

New Tag Temperature Controller

INCLUDING an entirely new design of flexible seamless metal bellows and featuring additional design and material improvements, a new type of Tag Self-Operating Temperature Controller has been introduced by the C. J. Tagliabue Mfg. Company, Brooklyn, N. Y. It is suitable for industrial applications where the close control obtainable with auxiliary power is not necessary, or where the steam pressure available is less than 10 pounds per square inch (necessary for opening these controllers). The new instrument has semi-balanced valves in sizes from ½ inch to 2 inches. Temperature ranges are approxi-



mately 75° between the limits of 30° F. and 450° F. No bulb stem or connecting tube is required as the necessary motive force for operation is the pressure of the steam, air, water or other medium under control, the controller valve being set in the supply line.

Book Reviews

Insulated Wire Compounding—Rubber and Neoprene. (Report No. 197). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 32 pp.

Divided into two sections, "Insulated Wire—Rubber" and "Insulated Wire—Neoprene," this report contains numerous representative insulated wire formulas, with different types of accelerators or accelerator combinations, which should meet most of the requirements of the various manufacturers regardless of the type of equipment used or specifications to be met, according to the company. Physical data tables follow each formula, with reference being made in most cases to the desirable characteristics and suitability of the accelerators or accelerator combinations involved. The advantages of neoprene (formerly known as DuPrene) in insulated wire manufacture are also pointed out in the report.

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Neoprene Heels and Soles. (Report N-1). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 8 pp.

Pointing out the advantages of heels and soles made of neoprene, due to its resistance to oils, solvents, fats, etc., over those made of rubber and reclaim for use by workers in garages, refineries, dairies, chemical plants and other places where conditions are detrimental to rubber, this report consists of a number of suggested compounds for neoprene heels and soles, the compounds selected having physical properties approximating those of high-grade commercial rubber products. For purposes of comparison rubber heel and sole compounds are also shown. A summary of tests appears beneath each formula.

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Utanol in the Rubber Industry. (Bulletin No. 109). Woburn Degreasing Company of N. J., Harrison, N. J. 6 pp.

The properties, physical characteristics and advantages of Utanol, a natural bitumen with about 12 to 15% of firmly combined sulfur, which occurs in a deposit under the Great Salt Lake, are outlined in this bulletin. Extracts from reports on factory tests covering a period of more than four years are also given, indicating the uses of the material in reclaiming rubber, as a softener and scorch reducer in rubber stocks, and as a softener and tack producer for neoprene. It is also recommended for insulating tape, wire and cable compounds because of its water resistance and dielectric properties.

•

Mac's Proximate Coal Analyses. By William C. MacQuown. Published by the Coal Information Bureau, Inc., Union Trust Bldg., Pittsburgh, Penna. 96 pp. $5.00.

Alphabetically arranged by name of mine, followed by such data as location, operator, selling agents, data on the condition of the sample, size and seam, etc., this publication in directory style contains proximate coal analyses on the majority of mines in the United States. Other information includes an alphabetical list of coal operators and data on the description of the ultimate and proximate analyses of coal and method used to determine the proximate analysis. Of interest to the buyers and sellers of large quantities of coal.

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Fourth Annual Report. Commodity Exchange, Inc., 81 Broad Street, New York City. 12 pp.

Briefly covering activities of the past year, this report points out that the Rubber Inspection Bureau of the Exchange provided a net income of $6,887 for the year, although the Hide Inspection Bureau showed a net loss. A financial statement is part of the report. It is of interest to note that membership in the Exchange is now held by citizens of twenty foreign countries.

Rubber Compounding Materials. The Barrett Company, 40 Rector Street, New York City. 8½x11 in.; 26 pp.

This booklet, attractively printed, describes in detail the various rubber compounding materials supplied by the company, including Cumar, Carbonex, B. R. C., Bardol, S. R. O., B. R. T., etc. The application of each material is discussed, while specifications and processing properties are given. In addition to this information, the booklet contains tables on the Physical and Chemical Properties of the Common Waxes, Specifications for Coke Oven Light Oil Distillates and Coal Tar Naphthas, a Specific Gravity Conversion table, Temperature Conversion table, and tables on Introconversion for Units of Volume and Weight, and Energy. Barrett has also published a 48-page booklet on "Cumar—Paracoumarone-Indene Resin", in which the uses of this compounding material in the rubber and other industries is given in detail, together with recommended formulae.

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The Coming Effect of the Surplus Tax on Factory Employment. By Allen W. Rucker, in collaboration with N. W. Pickering. Published by the Farrel-Birmingham Co., Inc., Ansonia, Conn. 16 pp.

Revealing the dependence of employment upon the number of going, profitable corporations, this study suggests that the first adverse effect of the 1936 Revenue Act and its surtax on undistributed earnings will be a substantial impairment of job security. Data from official sources are quoted. Two modifications to the Act are recommended. This is the 20th in a series of booklet-editorials prepared by the co-authors.

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Diamond Mechanical Rubber Goods. Mechanical Rubber Goods Division, B. F. Goodrich Company, Akron. 28 pp.

This catalog contains illustrations and descriptions of more than fifty mechanical rubber products and accessories, such as transmission and conveyor belting, hose and fittings, tubing, packing, cements, valves and mattings, sold under the Diamond trade-mark by Goodrich. Also included are tables listing horsepower capacity and minimum pulley diameter for belts of various sizes and plies, general data pertaining to belt selection and installation, etc.

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Directory of Association Members. Association of Consulting Chemists and Chemical Engineers, Inc., 50 East 41st Street, New York City. 52 pp.

This directory is distinguished in that in addition to a complete alphabetical list of members it also contains a membership list by geographical location, in addition to a section giving details about the work leading member consultants are especially prepared to undertake. These consulting services cover a vast range of subjects.

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Goodrich Batteries. B. F. Goodrich Co., Akron, Ohio. 24 pp.

Covering the 1936-37 line of Goodrich batteries for trucks and buses, this catalog contains descriptions of the new Kathanode construction which features several batteries, as well as of construction features of every type of battery in the line. Data on battery power requirements for trucks and buses and on replacements for trucks, buses, fire apparatus, tractors and hearses, are also included.

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U. S. Hose. Mechanical Goods Division, U. S. Rubber Products, Inc., 1790 Broadway, New York City. 48 pp.

The complete 1937 line of hose produced by the company, embracing a type for practically every need that may arise, is described and illustrated in this catalog. Among the more important types described are air, welding, water, spray, steam, oil, rotary and gasoline hose. A section is also devoted to hose couplings and fittings.

Editorial Comment

A Rubber Congress

THOUGH the final program is far from complete, it has definitely been established that an International Rubber Congress will be held in Paris this year in connection with the International Exposition of Arts and Crafts. The dates set for the Congress are June 28, 29 and 30. It is being sponsored by the Association Française des Ingenieurs du Caoutchouc et Autres Matières Plastiques (the French Association of Engineers of Rubber and Other Plastic Materials), which has issued a cordial invitation for American participation.

There can be no question that this Congress will be outstanding in the annals of rubber technological meetings, equal, if not more important, than the recent Rubber Symposium held at Delft under the auspices of the Netherlands Chemical Society. It represents the first truly international meeting ground for rubber technologists. That latest developments will receive the lion's share of attention is evident from the fact that in seeking papers the French Association stresses those on latex, synthetic rubber and rubber derivatives. Papers on other chemical or technological subjects, however, will also be presented.

We concur heartily with *Rubber Chemistry and Technology* in the suggestion that some American rubber chemist be selected to organize an American delegation. We further suggest that some committee be chosen to secure technical papers from American rubber chemists and technologists for presentation at the Congress. Surely, from the ranks of the Rubber Division of the American Chemical Society such a man and such a committee can be found. Early action on the part of its Executive Committee is suggested.

On its part, the French Association promises to furnish every inducement to attract a large American delegation, including reduced railway fares, attendance at the Congress without expense, advance hotel arrangements, etc. It is hoped that a number of American chemists will find it feasible to make arrangements for attending the Congress.

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The Tire Situation

ONCE again the tire manufacturers have moved up prices, this time by 6% on all grades and sizes, with the increase placed at the door of higher crude rubber prices. Rumor is rife that a second 6% rise will be put into effect at the beginning of the Spring season, dealers benefitting by purchasing Spring stocks at present prices. From all appearances the tire producers are working steadily toward a sound, profit-making level, with price-cutting tactics definitely in the discard.

An encouraging note is found in the fact that tire manufacturers are again following the crude rubber market closely, reflecting its condition in the price of tires and tubes. In depression years these manufacturers followed the downward trend of crude rubber prices by using it as an alibi for decreasing their retail prices, although most of them had large inventories of crude rubber charged down as low as 2½ and 3 cents per pound.

If the manufacturers had moved up tire prices to correspond with the rising crude rubber prices they would have had an excellent chance for profit-taking. Unfortunately, prices were maintained at a level more closely corresponding to where crude rubber sold at its low rather than at its price level when the tire was marketed. Naturally the public received the benefit of these conditions, to the detriment of tire company security holders.

But it seems that even tire manufacturers can learn from the school of experience. This seems evident from the harmony and cooperative spirit that has prevailed in the tire field for the past two years. Price wars have been marked by their absence, and this absence has contributed considerably to the improved financial condition of most tire manufacturers, practically all of them showing substantial profits for the past year.

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Moderation Required

IT BECOMES increasingly evident that some moderation to the surtax on undistributed profits must be made. There is a growing sentiment that the surtax will place a brake on expanding business activity. It is pointed out that if a medium-sized corporation retains 50% of its earnings to reinvest in its business, even for expansion or development, it is required to pay a surtax equal to 21% of the amount retained.

One of the strongest arguments against the percentages involved in this special tax is presented by the Chamber of Commerce of the United States. In 1932, about 452,000 corporations made income tax returns. Only 82,000 of these showed profits. It is difficult to imagine the chaos which might have occurred if the remaining 370,000 corporations operating at a loss had not accumulated respectable surpluses to tide them over a period of depression which continued not for one year alone but for a series of years.

The difficult days of 1930-1934 must not be so quickly forgotten. We are currently enjoying better business with profits again in the headlines, but depleted surpluses must be built up to withstand possible future punishment. Logic demands moderation of the surtax on undistributed profits.

CURRENT • NEWS of the Rubber Industry

FEBRUARY, 1937

LABOR DISORDERS ARE AGAIN RAMPANT

Sit-Downs and Strikes Interrupt Operations at Goodyear, Goodrich, Firestone, General, and Others, with More Trouble Seen

A series of sit-downs and walk-outs featured labor-management relations in the rubber industry this past month, some of them of lengthy duration, others being quickly settled. Manufacturing schedules at the plants of Firestone, Goodrich, Goodyear, General, La Crosse Rubber Mills, Kelly-Springfield, Continental Rubber Works and other companies were disrupted.

One of the first plants affected was the steel products plant of Firestone in Akron, where approximately 700 workers on three shifts were held up by a sit-down which occurred on January 20th when two men servicing a crane which handles steel from a warehouse to the tire rim producing line quit work over a wage grievance, according to report, a sympathetic sit-down quickly tying up the plant. Employees reported back to work after a two and a half day interruption of production when the executive committee of the Firestone local labeled the sit-down "unauthorized" and would not negotiate the workers' grievance while they refused to return to work.

Strike at Kelly-Springfield

On the same date, January 20th, a sit-down strike at the Cumberland, Maryland, plant of Kelly-Springfield, threw approximately 1,800 employees out of work, with all production halted. The trouble originated in the drum tire division over a number of grievances, including a demand for higher wage rates. The plant was closed for 15 days and reopened on February 5th after an agreement between the management and the union had been approved, calling for negotiations over grievances.

All Goodrich Akron plants were shut down on January 29th shortly after 31 workers in the basic compounding department sat-down over a wage dispute. An innovation was introduced during this tie-up when the management issued "passes" to 15 of the sit-downers which permitted them to return to the plant after attending conferences aimed at lifting the sit-down. Work was resumed on February 1st with plans made for discussion of the grievance.

Arrest of a suspect in the bombing of rubber workers' homes caused a stoppage of work at General's plant on February 1st, when workers swarmed to police headquarters, but work was resumed twenty-four hours later when the management assured the workers that no industrial spies were employed by the company. No other issue was raised in this instance.

Approximately 4,000 workers were thrown out of work when Goodyear shut down Akron Plant 2 after a disturbance in the tire division during which company officials were "shoved out" of the plant, according to report, after they had entered the plant in company with an employee who was not permitted to work allegedly because of non-payment of union dues. Members of the Goodyear local voted unanimously to return to work on February 7th, following a proposal made by the management to discuss the dispute at an early meeting.

A closed shop and increased wages were among the demands made by the Continental local which walked out on strike on January 18th, causing a shutdown of the Erie, Penna., plant of the Continental Rubber Works. This flare-up was settled on January 23rd, the company conceding only to a 40-hour week, according to Dr. Paul Henkel, company vice-president. A meeting to discuss wage rates was also arranged, although Continental recently granted employees a 7½% increase. The plant was reopened on January 25th.

7 Tires A Year!

Seven tires a year are required for each automobile operated in Central Africa, according to Frank H. Berchtold, of the export division of the Firestone Tire and Rubber Company. This large number of tires per car per year is necessitated because of unfavorable road conditions combined with all-year-round extreme heat. This data was furnished by Mr. Berchtold during an address recently made before members of the Optimists Club of Akron.

CONSUMPTION IN 1936 REACHED NEW HIGH

Gain of Approximately 62,000 Long Tons Over Previous High Is Recorded in Consumption While Stocks Are Down Considerably

Consumption of crude rubber by manufacturers in the United States for the calendar year 1936 is estimated to have been 573,522 long tons, according to annual statistics compiled by the Rubber Manufacturers Association. This is approximately 62,000 long tons over the revised estimate of 491,544 long tons consumed during the previous year. 1936 consumption reached an all-time high, and was approximately 200,000 long tons more than the 375,980 long tons consumed in 1930.

In keeping with the record consumption, imports of crude rubber during 1936, according to the RMA's figures, reached a total of 490,858 long tons, as compared to the 448,116 long tons imported in 1935. This represents the largest amount of crude rubber imports since the year of 1931.

Domestic Stocks Drop

Despite increased imports, total domestic stocks of crude rubber on hand on December 31st, 1936, amounted to only 218,844 long tons, a slight gain over the 212,515 long tons on hand at the end of the previous month, but approximately 82,000 long tons below the 303,000 long tons on hand December 31st, 1935. The stock situation is an excellent example of the growing effectiveness of the International Rubber Regulation Committee's program.

Reclaimed rubber consumption for 1936 is estimated to be 130,048 long tons, approximately 17,000 long tons more than the 113,078 revised long tons consumed in the previous year, while production is estimated to be 150,571 long tons for 1936 as against 122,948 long tons in 1935, a gain of approximately 28,000 long tons. Reclaimed stocks on hand December 31, 1936, are estimated to be 30,573 long tons, as compared with 25,069 at the end of the previous year. Both consumption and production figures on reclaim were the best recorded since 1930.

Statistics compiled by the Rubber Manufacturers Association for the month of December, 1936, will be found elsewhere in this issue.

CARL PHARIS HEADS PHARIS TIRE COMPANY

Following the sale of the stock interests of A. R. Lindorf, erstwhile president of the Pharis Tire and Rubber Company, Newark, Ohio, and three other local stockholders of the company, to Eastern interests, Carl Pharis has been elected president of the company bearing his name. He has also been named treasurer by the new directorate. The "Eastern interests" were not named in the announcement made by Mr. Lindorf.

In addition to the elevation of Mr. Pharis to the presidency, W. I. O'Bryan, associated with the company for 12 years as comptroller, has been named secretary and comptroller, while W. A. Patterson, with Pharis for the past 16 years, lately as assistant sales manager, has been appointed sales manager. Both of these men will be associated with Mr. Pharis on the new board of directors. Ralph Reel, connected with the company for the past 11 years as chief chemist, has been moved up to the post of plant superintendent, while E. E. Laughlin, serving as head of the bicycle tire department, has been named chief chemist.

The Pharis Tire and Rubber Company was organized twenty-five years ago by Mr. Lindorf and Mr. Pharis. Starting with a daily production of 50 tires, the company is currently said to be producing 6,000 automobile tires, 5,000 tubes and 4,000 bicycle tires daily. At one time Pharis was the sixth largest tire producer in the country. It is one of Newark's most substantial industries and the plant is reported to have operated on a remarkably steady schedule during the last several years.

Papers were filed in Columbus on January 27th to incorporate a new Pharis Tire and Rubber Company, the old company consenting to the new company's use of its name. According to Mr. Pharis, it will have substantially the same officers and directors and will assume all assets and liabilities of the old firm. He also stated that the new Pharis concern will issue common stock only, making the capital structure flexible and uniform. Capital used to redeem the old company's preferred stock will be restored to the treasury by the issuance and sale of additional common stock.

RATE REDUCTION ON OLD TIRE SHIPMENTS

Effective February 28th, tires shipped to factories or repair stations for repairs or retreading will be charged freight rates on less than carloads 30% and on carload shipments, minimum 30,000 pounds, at 25% less than the rates on new tires. The reduction was secured by the Traffic Committee of the Rubber Manufacturers Association which recently petitioned the rail carriers' Classification Committee on the ground that after repair these tires are charged the new tire rate and therefore the same rate should not apply to both the inbound and outbound movement.

Particular attention is called to the fact that in delivering shipments to the carriers for transportation as of the effective date, February 28th, the description shown should be used in order that the shipments will be properly charged and also that full compliance will be had with the new classification provisions. The description applies only to tires which are returned for repair or retreading.

R. H. Goebel, RMA secretary, stresses the point that the freight rates on these articles should not be confused with the rates applicable to scrap rubber. The latter material should be continued to be described as scrap rubber so that the proper rates will be applied to that class of material and thereby avoid the possibility of misbilling, a violation of the law.

Incorporate Era Products

The Era Products Corporation, Upper Sandusky, Ohio, manufacturers of sheet metal stamped toys, was recently incorporated at Columbus. In filing incorporation papers, the company announced that effective January 15th it will manufacture a line of rubber products including erasers, washers, gaskets, etc. Incorporators included C. J. Marshall, George D. Hoffman and Earl McKinn. Raymond H. Stansberry was the attorney.

TIRE PRICES ADVANCE 6% ON ALL GRADES

An increase of 6% on all grades of automobile tires and tubes was put into effect by the tire manufacturers on January 18th. Goodyear, first to announce the increase, issued a statement which said in part, "The increase applies to all types of tires except bicycle tires and pneumatic tires for toys; these increases are due to a rapidly rising crude rubber market." Goodyear's announcement was quickly followed by Goodrich, General, Firestone, U. S., Dayton and others.

List prices for tires at the start of the current year were at the highest level since 1929. While the 6% increase brings the price level above the 1930 figure it does not bring the general list up to the 1929 level, i.e., 64.4%.

According to a Goodrich official, however, the horizontal price increase of 6% is "not even sufficient to compensate for the current increase in the price of crude rubber alone, to say nothing of other increased costs." It is believed that the tire manufacturers contemplated a 12% increase on all lines and grades of tires and tubes, but decided to postpone the additional 6% rise until the beginning of the Spring retail buying season which will give the dealers an opportunity to place Spring dating orders at prices which will mean an increased margin of profit in May.

U. S. TIRE DEALER ADVISORY COUNCIL HOLDS MEETING

Attendants at the first meeting of the Dealer Advisory Council of the U. S. Tire Dealers Mutual Corporation, from left to right: Edward N. Cummings, Portland, Oregon; Harry Bielfield, Detroit; Milton Rosen, St. Paul; L. D. Tompkins, company vice-president; H. N. Hawkes, company general sales manager; Joseph H. Walsh, Jacksonville, Florida; and William P. Yoerg, Holyoke, Mass.

Marking the first time in the history of the tire industry that management sat down with an official group of dealers to discuss mutual business policies, executives of the recently-formed U. S. Tire Dealers Mutual Corporation held their first meeting with the company's newly appointed Dealer Advisory Council at the headquarters of the company at 1790 Broadway, New York City, on January 25-26. A program is said to have been fomulated whereby dealers may cooperate to their mutual benefit with the company. The general theme of the two-day conference, which was hailed by the dealers as a progressive step, was one of increased efficiency and economy in distribution, and a series of suggestions was prepared that should prove beneficial to dealers handling the U. S. line. At the present time there are five dealer members on the Advisory Council, with additional members expected to be appointed soon.

Financial News

GOODYEAR DOUBLES ITS NET EARNINGS

Net consolidated earnings of the Goodyear Tire and Rubber Company, Akron, for the year ended December 31, 1936, after all prior charges including taxes, depreciation and interest, amounted to $10,831,031, representing an increase of $5,378,791, or 98%, over the $5,452,240 figure reported for the previous year. The company also announced a dividend of 50 cents per share on common stock, representing the first payment on this stock since February, 1932.

In addition to this payment, the regular dividend of $1.25 per share for the first quarter of 1937 on Goodyear $5.00 convertible preferred stock was announced, as well as a dividend of $14.75 per share on the outstanding second preferred stock, representing payment in full of all accruals on this stock as of April 1, 1937.

Consolidated sales of the parent company and subsidiaries totaled $185,915,674, an increase of 13% over the $164,863,974 reported for 1935. Current assets are shown at $114,233,676 on the consolidated balance sheet, including cash on hand of $13,078,142, against current liabilities of $8,569,494, a ratio of approximately 14 to 1. Inventories of raw materials and finished products were carried at $76,693,446. Net working capital was shown at $105,664,182, which compares with $98,456,388 at the end of the previous year, an increase during the year of $7,207,794.

Extends Exchange Period

Goodyear recently extended the period within which the company's second Preferred Stock may be deposited for exchange into the new senior $5.00 Convertible Preferred stock and common stock (or negotiable scrip for fractions of common shares), under the plan for rearrangement of capitalization, until March 13th.

In the event, however, that a dividend on the Second Preferred Stock is declared payable to holders of record prior to March 13, the board of directors has determined that the day preceding the dividend record date will be the final one on which shares may be deposited for exchange under the terms of the plan. Notice of the declaration of such a dividend and the resulting termination of the exchange period will be given to all holders of Second Preferred Stock at least 10 days in advance of the record date, according to the company.

The board has also voted a dividend of $4.25 per share on the new $5 Convertible Preferred Stock to be issued on exchanges under the plans that are made within the extended exchange period. This dividend will be payable on March 25 to the original holders of record of the new stock issued on such exchanges. Holders of more than 80% of the Second Preferred Stock are said to have already deposited their shares for exchange under the terms of the plan.

GENERAL TIRE NETS $1,291,011 FOR YEAR

For the fiscal year ended November 30, 1936, the General Tire and Rubber Company, Akron, and subsidiaries, reported a net profit of $1,291,011, after all charges and taxes, equivalent to $2.53 each on 443,100 shares of $5 par common stock. In the preceding twelve months General had a net loss of $115,756.

Sales in the last fiscal year, not including those of foreign affiliated companies, amounted to $17,909,886, as compared with $15,501,999, an increase of $2,407,886 or 15½%. Current assets were reported as $8,583,480 and current liabilities as $2,367,471, a ratio of 3 to 1. Cash on hand as of November 30th was shown as $744,352, notes payable to banks amounting to $1,200,000.

In a statement accompanying the report President William O'Neil indicated that General has no bonds or funded debt and that $88,400 of its preferred stock had been retired during the year by purchases for sinking fund so that outstanding preferred stock has been reduced to $2,799,200. He also stated that the Wabash, Indiana, plant recently purchased by the company is being equipped rapidly with machinery "and we hope to start operations there within the next few weeks." Mechanical goods only will be produced at the new plant.

Gain for Lee Rubber

Addressing stockholders at the annual meeting held on January 28th, John J. Watson, chairman of the board, Lee Rubber and Tire Corporation, Conshohocken, Pennsylvania, stated that profit for the first two months of the current fiscal year was estimated at $148,000 as compared with a loss in the corresponding months of the previous year. He also stated that the company's plants were running at capacity.

Pharis Has Big Gain

The Pharis Tire and Rubber Company, Newark, Ohio, earned a net income of $241,888 for the year of 1936, according to figures filed by the company with the Securities and Exchange Commission in connection with its application to issue new stock subsequent to its recent reorganization as outlined elsewhere in this issue. In the previous year, Pharis reported net earnings of $51,405.

HEWITT RUBBER PLANS TO SPLIT ITS STOCK

According to the terms of a proposed program, the Hewitt Rubber Corporation, Buffalo, New York, plans to split its present stock two for one in the near future. Thomas Robins, Jr., president of the company, announced on January 14th that Hewitt had entered into an agreement with an underwriting group headed by F. Eberstadt and Company, Inc., and including the Carlton M. Higbie Corporation and Allison and Company, to publicly offer 52,000 shares of new common stock. Proceeds from the sale of the new stock will be used to retire outstanding bonds and debentures, according to Mr. Robins.

A special stockholders' meeting has been called to secure approval of the plan for splitting the stock which would increase the company's authorized common from 100,000 shares to 200,000 shares and change the par from $10 to $5 a share. If the proposed program is approved, Hewitt's capitalization will consist of common stock only, of which 168,188 shares will be outstanding. The company has agreed to apply for listing on the New York Curb Exchange following public distribution of the new stock. The new issue, if approved, will be shortly registered with the Securities and Exchange Commission.

Purchases Bedford Factory

The recently-organized Virginia Rubatex Corporation has purchased the factory of the Bedford Tire and Rubber Company, at Bedford, Virginia, the premises of which it has occupied under another name for the past 18 months under lease. According to Wesley L. Smith, vice-president and general manager, Virginia Rubatex has leased exclusive rights to manufacture rubber goods for land and sea aircraft, goods for use in athletics and small household articles, and to produce sheet rubber under a lease, shared by other companies, from the parent company, Rubatex Company, New York City. Headquarters of the Virginia Rubatex Company are maintained in Newark, N. J. Besides Mr. Smith, executives include Stanley Odlum, president; Margaret Mully, secretary; and Norman Hamer, factory superintendent.

Rubber Congress Planned

An International Congress on Rubber will take place in Paris on June 28th to 30th inclusive in connection with the 1937 International Exposition of Arts and Crafts, it is announced. A detailed program is being planned as well as a series of banquets and visits to industrial plants of interest to rubber technologists. The Association Francaise des Ingénieurs du Caoutchouc, 19 Boulevard Malesherbes, Paris, is arranging the Rubber Congress. Further details will appear in an early issue.

SET EXPORTS AT 85% FOR THIRD QUARTER

Meeting in London on January 26th, the International Rubber Regulation Committee again acknowledged the demand of rubber consuming countries to make more crude rubber stocks available by increasing the permissible exports from signatory countries to 85% of basic tonnages for the third quarter of the current year. The quota for the first quarter has been set at 75% and the second quarter at 80%. In some circles it is believed that the percentage for the second quarter will be raised before April 1st.

Including Siam and French Indo-China, both of which operate under special quotas, permissible crude rubber exports from participating countries amount to 283,931 long tons during the third quarter, according to figures compiled by the statistical division of the Commodity Exchange. This compares with permissible exports of 252,469 long tons for the first quarter and 268,200 long tons for the second quarter of 1937. Total permissible exports for the first nine months of this year amount to 804,600, on the basis of present quota figures, which exceed those for the last nine months of 1936 by approximately 29%.

$200,000 Mat Order Awarded

A contract for approximately $200,000 of rubber-link floor matting has been awarded by the Government to the American Mat Corporation, Toledo, Ohio. This is believed to be the largest order of its kind placed by the Government, the mats being intended for use in public buildings, court buildings and post offices throughout the country. The American Mat Corporation are national distributors for the Toledo Rubber Products Company, Middlefield, Ohio, the latter company securing its rubber parts from the Johnson Rubber Company, also of Middlefield, and doing its own assembling and finishing. Smith M. Johnson is president of both Middlefield concerns.

Filatex to Move Plant

The Filatex Corporation, which maintains offices at 1450 Broadway, New York City, will shortly move its factory from Northampton, Pennsylvania, to Trenton, N. J., according to present plans. The selected location at Trenton embraces 21,000 square feet of manufacturing space, a basement and a two-story office building. Filatex is affiliated with the Sylvania Industrial Corporation.

Crown Rubber Moves

The Crown Rubber Products Company, distributors of mechanical and industrial rubber products, has recently moved to larger office and warehouse quarters at 609 North Sixth Street, Milwaukee, Wisconsin. The new location provides the company with double the amount of space previously occupied.

JOHNSON AND MINNIG JOIN WITCO CARBON

C. R. Johnson

Carl J. Minnig

Appointment of C. R. Johnson as technical director, and of Carl J. Minnig as general sales manager, has been announced by the recently-organized Witco Carbon Company, New York City. Mr. Johnson has had experience in both the rubber and carbon black industries serving as chief chemist of Goodyear at one time, and later acting as manager of the Goodyear development department. During the war he was commissioned a major in the Chemical Warfare Service as technical director of the Gas Defense Division. More recently Mr. Johnson was technical director for Godfrey L. Cabot, Inc. His articles in trade and scientific journals on carbon black include studies on volatile matter, the status of oxygen and its relation to accelerator adsorption. For four years Mr. Johnson was eastern sales representative of the Philadelphia Rubber Works Company.

Mr. Minnig's experience embraces both the oil and carbon black fields. First employed by the Standard Oil Company of New York, he later spent eight years with the American Meter Company. While with the latter concern he published the first formulas on orifice meters in conjunction with Henry Wescott. For a time Mr. Minnig was jointly in charge with Frank Finney of gas production and gas measurement at H. V. Foster's Indian Territory Illuminating Company. Since 1921 he has been in charge of natural gas products for the Philips Petroleum Company.

Under Mr. Johnson's direction, Witco is laying plans for complete laboratories to control the quality of its product, conduct research and to serve its customers, while under Mr. Minnig's supervision plans are rapidly being formulated for the commercial marketing of Witco carbon black. The company's plant is located at Sunray, Texas, with headquarters maintained in New York City.

New Du Pont Colors

Two new rubber dispersed colors, Rubber Blue PCD and Rubber Green BD, have been introduced by the Rubber Chemicals Division, E. I. du Pont de Nemours and Company, Inc., Wilmington, Delaware. The coloring pigment in the new blue is identical chemically with Monastral Fast Blue BS, developed by Imperial Chemical Industries (of England) and which is being sold under the same name by the Dyestuffs Division of du Pont to industries other than rubber. The reason for a special name on the rubber color is simply to make the name conform to existing designations for other du Pont rubber colors. The new green pigment is a blend of the new blue and Yellow QBD. Both of the new dispersed colors are said to have excellent light fastness and other desirable qualities. The company has issued standard color cards.

Buys Rubber Glove Business

Purchase of the rubber glove business of the Philadelphia Rust Proof Company, Philadelphia, Penna., by the Surety Rubber Company, Carrollton, Ohio, was announced on January 28th by S. S. Hall, president of the latter company. The equipment and stock of the Philadelphia concern, which has been producing rubber-coated fabric gloves for the past several years, is being moved to Carrollton.

Waste Dealers to Meet

The 24th Annual Convention and Banquet of the National Association of Waste Material Dealers, Inc., will be held at the Hotel Sherman, Chicago, on March 15th to 17th, inclusive. Banquet and hotel reservations received to date point to an unprecedented attendance, according to Association officials.

AKRON RUBBER GROUP HEARS H. T. YOUNGREN

H. T. Youngren, of the Oldsmobile Division of General Motors, was the chief speaker at a meeting of the Akron Group, Rubber Division, A.C.S., held on January 15th, at the Akron City Club, with approximately 250 in attendance. Introduced by V. L. Smithers, Mr. Youngren held his audience for one hour and twenty minutes as he discussed what it means from an engineer's standpoint to bring out a new automobile model.

The speaker dwelt upon each of the essential parts involved, such as reduction of waste or sheet metal resulting from the formation of intricately shaped body members, stabilizers, frames, engine, etc. He stated that the octane rating of gas must be held in close limits to secure best engine performance and pointed out that despite the cooperation of producers of gas too wide a variation persists in some sections of the country.

Discussing the Diesel engine, Mr. Youngren expressed the opinion that it is not yet suitable for passenger cars, the cost being too great and the weight too much. Weight distribution and satisfactory cooling arrangements must be worked out before the rear drive car can be adopted, he said.

In concluding his address, Mr. Youngren stated that the public wants all of the latest gadgets, such as heaters, radios, etc., and that when all of them are used at one time the current consumption is much greater than can be supplied with ordinary generators, especially when cars are operated at low speeds.

VARIETY PROGRAM AT LOS ANGELES MEETING

A variety program featured the February supper meeting of the Los Angeles Group, Rubber Division, A.C.S., with moving pictures, technical talks and humorous anecdotes given. The meeting was held on February 2nd, in the Rainbow Room of the Mayfair Hotel, with ninety members and guests present. Chairman T. Kirk Hill presided.

James H. Norton of E. I. du Pont de Nemours and Company, Inc., was the principal speaker of the evening. He discussed the characteristics of neoprene (formerly known as DuPrene), pointed out its uses, its prospects for the future and illustrated his talk with motion pictures which showed a variety of articles made from the synthetic material, particularly those made for use in the oil fields. The moving picture, "The Wonder World of Chemistry," was also shown through the courtesy of du Pont.

Ed Nahm, Naugatuck Chemical Division, U. S. Rubber Products, Inc., was introduced and spoke briefly. P. K. Holland, branch manager of the Zellerbach Paper Company, gave a humorous talk on "Personality in Paper," and B. E. Dougherty reported on "Personalities." A committee was then appointed to consider methods of increasing treasury funds to insure a surplus for program talent.

Door prizes were donated by W. D. Voit, of the W. J. Voit Rubber Company, Inc., Los Angeles, consisting of three different size rubber balls. These went to Frank Baglan (West American Rubber), Gordon Boelter (Goodyear), and A. B. McMurray (National Standard Co.), respectively. Two special prizes, a Magic Maid Mixer and a cocktail shaker, donated by B. E. Dougherty and Ed Nahm, were won by Sam Tanney (Muehlstein) and E. W. Sharp (Kirkhill Rubber). Favors were also distributed through the courtesy of H. A. Schumacher, manager of the du Pont plant at El Monte, California.

It was voted that the next meeting on Tuesday, March 2nd, be held in the same location in the Mayfair Hotel, the dining room of the Los Angeles Athletic Club previously used proving too small for the growing attendance. Complete arrangements have already been made for both program features and door prizes.

Average Earnings of Workers

Average weekly earnings of wage earners in the rubber industry in November, 1936, amounted to $28.15, according to a survey recently concluded by the National Industrial Conference Board, New York City. The rubber industry was seventh in a list of 25 industries from the standpoint of weekly earnings, being preceded by the automobile, printing (news and book), machine, paint and varnish, and iron and steel industries, but was third in the matter of hourly earnings with an average of 76 cents per hour, preceded only by the printing (news) and automobile industries.

Set Rhode Island Meeting

The Spring meeting of the Rhode Island Rubber Club will be held at the Narragansett Hotel, Providence, Rhode Island, on Friday evening, March 12th. Dr. A. A. Somerville of the R. T. Vanderbilt Company is scheduled to deliver an address under the title, "More Pictures than Talk." Edward J. Kelly, Superintendent of the Rhode Island State Police, will introduce two of his experts, viz: Dr. Wallace Bohrer, who will talk on "Scientific Detection of Crime," and Sergeant James E. Norman, who will demonstrate the methods, apparatus and materials used in detecting crime and proving guilt or innocence. Tickets and reservations may be secured from Samuel H. Tinsley, Coated Textile Mills, Inc., Pawtucket, Rhode Island, secretary-treasurer of the club.

CHICAGO GROUP PLANS NEXT TWO MEETINGS

Plans are rapidly taking shape for the next two meetings of the Chicago Group, Rubber Division, A.C.S., to be held on February 26th and March 26th, respectively. As usual, both meetings will be held in the Sherman Hotel in Chicago, with dinners being served prior to the program for the evening.

At the February meeting, of which J. Kirschner, chief chemist, Dryden Rubber Company, Chicago, is chairman, U. L. Harmon, vice-president of Dryden, will speak on "Business Management through Three Typical St ges of Development with Co-ordinated Functioning of Interdepartmental Relationships." Prior to his connection with Dryden, Mr. Harmon was assistant manager of the mechanical goods division of Firestone, and is well qualified to discuss the selected subject. In addition to this talk, another feature is being arranged, according to B. W. Lewis, secretary of the Group.

A talk under the title of "More Pictures than Talk" will be given by Dr. A. A. Somerville at the March meeting of this group. Dr. Somerville is also scheduled to address the Rhode Island Rubber Club on March 12th on the same topic. Tickets for the Chicago meetings are $1.50 and may be secured by writing to Mr. Lewis at Wishnick-Tumpeer, Inc., 365 East Illinois Street, Chicago, Ill.

BOSTON RUBBER GROUP HEARS TWO SPEAKERS

Two speakers, E. G. Holt, assistant chief of the Leather and Rubber Division, and R. M. Horn, of the Photographic Laboratory, Massachusetts Institute of Technology, were scheduled to address a meeting of the Boston Group, Rubber Division, A.C.S., in the Hotel Kenmore, Boston, on February 12th.

According to advance reports, Mr. Holt was to speak on "Restriction and the Current Rubber Situation," while Mr. Horn was to talk on "Seeing the Unseen." The latter was scheduled to illustrate his talk with an Edgerton Stroboscope and ultra-rapid motion pictures.

Elect Rubber Trade Officers

At its annual meeting held recently, the Rubber Trade Association of New York, Inc., re-elected Robert Badenhop, H. Muehlstein and B. G. Davy, as president, vice-president and secretary-manager, respectively. Louis V. Keeler was elected treasurer.

Toy Fair in April

The 1937 American Toy Fair will be held from April 5th to 17th. As usual, there will be complete exhibits at permanent showrooms in New York and at the Hotel McAlpin. The annual event is sponsored by the Toy Manufacturers of the U. S. A., Inc.

Names in the News

GEORGE A. SMITH, assistant manager of mechanical goods, Hudson Street Branch, U. S. Rubber Products, Inc., New York City, was tendered a dinner in the Hotel Lafayette, New York, on January 29th, by friends and associates, in honor of the fifty years of service with U. S. Rubber he recently completed.

A. M. POULTON has been named general purchasing agent for the National Rubber Machinery Company, Akron. He was connected with the Banner Machine Company at the time of the formation of National Rubber Machinery and prior to being transferred to the Akron office acted as purchasing agent of the Columbiana (Ohio) Division.

DR. H. E. FRITZ, recently appointed manager of Koroseal sales and development for Goodrich, addressed a meeting of the Engineers Club in the Chittenden Hotel, Columbus, Ohio, on January 18th. He discussed synthetic elastics.

ROBERT BADENHOP, president, Robert Badenhop Corporation, New York City, sailed for the Far East on January 10th, where he will visit his company's numerous connections in the crude rubber producing centers. He will return via San Francisco late in June.

R. S. WILSON, vice-president in charge of sales, Goodyear Tire and Rubber Company, Akron, discussed "The Requisites of a Sales Manager" at a meeting of the Sales Managers' Bureau of the St. Louis Chamber of Commerce in St. Louis on January 8th.

W. E. ENGLAND, who served as chief engineer of the Ohio Rubber Company for two years prior to September, 1936, has been appointed chief engineer of the Willys-Overland Company, Toledo, Ohio.

A. W. CARPENTER, manager, testing laboratories, B. F. Goodrich Company, Akron, completed 10 years of service with the company last month. He has occupied his present post for the last several years.

PROSPER CHOLET, of H. Muehlstein & Company, New York City, sailed on the *S.S. Champlain* on January 23rd. He will visit several European countries in the interests of the company.

F. B. DAVIS, JR., president, U. S. Rubber Company, New York City, was elected a regional vice-president of the National Association of Manufacturers at a meeting of the Association's directorate held at the Waldorf-Astoria in New York on January 22nd.

DR. PHILIP SCHIDROWITZ, eminent British rubber technologist, was a recent visitor to this country, crossing particularly to appear as a witness in the Vultex *vs.* Heveatex suit which started in Boston on January 26th. He was scheduled to return to England prior to February 15th.

J. M. ROBBINS has been named manager of the Technical Control Laboratory of Pacific Goodrich in Los Angeles, temporarily taking the place of W. R. HUCKS who was transferred to the Oaks, Pennsylvania, plant.

JOHN R. GAMMETER, noted Akron inventor, sketched the history of rubber and its importance to bus and commercial transportation in a speech at the closing session of the 14th Annual Convention of the Ohio Motor Bus Association, held in Akron on January 14th.

JOHN INGLE, managing director, Goodyear Orient Company, recently completed 20 years of service with Goodyear, practically all of which have been spent in the company's interests in the Far East.

DR. WOLFGANG B. KLEMPERER, chief of the research department, Goodyear-Zeppelin Corporation, Akron, has been granted a long leave of absence to conduct research activities at the factory of the Douglas Aircraft Company.

HARRY HUTCHINSON, production manager, White Rubber Company, Ravenna, Ohio, delivered a talk on the general subject of rubber before a meeting of the Ravenna Rotary Club on January 25th.

CLAIR B. ZINK has been transferred from Akron to the Los Angeles plant of the B. F. Goodrich Company where he will take charge of distribution activities. Prior to his departure for the coast he was given a farewell party by associates at Young's Hotel in Akron.

J. M. AVERY has been named representative of Arthur D. Little, Inc., Cambridge, Mass., in the New York area. He is making his headquarters at 420 Lexington Avenue, New York City.

E. H. BROOKS, head of the purchasing department of the Goodyear Tire and Rubber Company, Akron, has been named director of the purchasing division of the parent company and all of its subsidiaries. G. E. PRICE has been moved up to the post of purchasing agent, while R. D. CHITTENDEN becomes assistant purchasing agent.

Fritz Heads Koroseal Sales

Dr. Howard B. Fritz

Dr. Howard B. Fritz, formerly chemical sales manager of the B. F. Goodrich Company, Inc., mechanical division, has been named manager of Koroseal sales and development. Koroseal is the synthetic elastic product introduced by Goodrich some time ago which possesses the characteristic of chemical resistance. Dr. Fritz, widely known in chemical circles, joined Goodrich in 1925. He received his master's degree in chemistry in 1913 from Ohio State University and, after spending eight years in industry, returned to the University in 1921 when he received his doctor's degree. He later served on the faculty of the University, prior to joining Goodrich. J. R. Hoover, associated with Goodrich in the laboratories and development departments since 1925, has been appointed to fill Dr. Fritz's former post.

Frecker Heads New Group

H. M. Frecker, of the Development Department, U. S. Rubber Products, Inc., Passaic, N. J., was recently elected chairman of the Technical Group, Mechanical Goods Division, Rubber Manufacturers Association. A. B. Merrill, of the Mechanical Goods Division, B. F. Goodrich Company, was elected vice-chairman. This group was formerly known as the Specifications Committee, the name being changed to give it a more clarifying term since its members delve into research activity other than specifications alone. The only change, however, was in the name, according to E. A. Foote of the RMA.

EDWARD WRIGHT, until recently with the Gates Rubber Company, Denver, has joined the sales engineering force of the Thiokol Corporation, Yardville, N. J.

C. W. SEIBERLING, vice-president, Seiberling Rubber Company, Akron, celebrated his 76th birthday on January 26th. As usual, he spent the day at the factory.

NEW ENGLAND NEWS

Russell Mfg. Company, Middletown, Conn., has been making extensive changes in its factory set-up in the course of a broad consolidation and modernization program. The elastic and non-elastic webbing divisions have just been re-located with the idea of eliminating the need of long trucking hauls. Inspection, finishing and packing of webbing are now completed on the ground floor, with conveyors used through the department. The webbing is made for use in suspenders, garters, women's girdles and other items.

The Holyoke Company, Inc., Holyoke, Mass., manufacturer of insulated wire, is about to increase its manufacturing space by the occupancy of a new two-story building, 140 x 60 feet in dimensions. The company is busy developing new lines. As yet it has elected no successor to the late A. J. Smethurst, who was its president.

Carl F. Siemon, veteran Bridgeport, Conn., rubber manufacturer, was re-elected president of the Twilight Club, Bridgeport, at a recent annual meeting.

Farnham Yardley, president of Jenkins Bros. Company, Bridgeport, Conn., was one of 17 employees and executives who received service medals at the 11th annual meeting of the Jenkins Bros. Veteran League, held on January 14 at the Stratfield Hotel, Bridgeport. Mr. Yardley has completed 25 years with the company. Medals awarded to other Jenkins men were for periods ranging from 25 to 45 years.

President Yardley announced that those years of service earned by present Jenkins employees while they were with the Crane Company before joining Jenkins Bros., will be considered by the company in awarding pensions. Bernard J. Lee, vice-president and sales manager, was toastmaster at the dinner-meeting.

"Rubber Plates and Their Place in Modern Printing" was the subject discussed by Frank Galvin, general manager and treasurer of the Royal Electrotype Company, Boston, Mass., at a meeting of the New Haven, Conn., Club of Printing House Craftsmen in the Elm City on January 22. In his talk he outlined the history of rubber and traced the development of printing from a rubber surface. The first United States patents on rubber printing plates were issued in 1853, according to the speaker.

Mr. Galvin described the four basic types of rubber plates, molded, cut, poured and plated, and the uses of each. He predicted a steady growth in the use of rubber by printers, saying it is particularly well suited for reproducing on certain types of surfaces. The adoption of rubber plates, he asserted, marks the first drastic changes in the fundamental principles of letter-press printing in 100 years. The talk was well received.

Heavy snows in the West have resulted in a stream of orders for rubber overshoes at the Naugatuck, Conn., plants of U. S. Rubber Products, Inc. Thousands of pairs have been shipped on rush orders from Texas, California and other points, both in carload lots and by express. Stock has been drawn from company warehouses in Beacon Falls and Waterville as well as the Naugatuck shipping rooms.

With wage and salary disbursements of the rubber factories contributing a lion's share, the monthly payroll total in Naugatuck is climbing toward the million-dollar mark, according to a report of the Naugatuck Chamber of Commerce. The December payroll, representing five paydays, was $946,861, distributed among 8,354 employees, an all-time record. Average pay of Naugatuck workers of all classes and in all types of factories was $113 for the month.

STATISTICS REVEAL UPWARD TREND IN 1935

General improvement in the domestic rubber manufacturing industry in 1935 as compared with 1933 is revealed by the Census of Manufactures for 1935 just released. Average annual wage earners in the year covered by the census were 114,612, or 7.8% greater than in 1933, while wages were 34.9% greater, amounting to $133,659,754. The value of products in 1935 totaled $677,437,237, or 43.3% more than the figure of $472,743,587 in 1933.

Production in the tire branch of the industry in 1935 comprised 65.9% of the grand total with $446,091,602 worth of products, while rubber boots and shoes amounted to 7.8% with $53,162,121, and all other rubber products totaling 26.3% with $178,183,514.

For the first time, the number of pneumatic tires produced during a calendar year is given in complete detail, as follows: passenger car tires, 42,479,133; truck and bus, 6,003,338; airplane, 28,086; other motor vehicles, 254,156; single-tube tires for motorcycles and bicycles, 2,338,767; and regular motorcycle and bicycle tires, 1,667,709.

Start Native Regulation

The government of the Netherlands East Indies has issued an ordinance making effective the introduction of individual restriction for native rubber in certain regions where a special duty is still being levied. The restriction measure is effective immediately.

Akron Briefs

Tentative date for the next meeting of the Akron Group, Rubber Division A.C.S., was set as March 19th, at a meeting of the Executive Committee, held on February 1, in the offices of the C. P. Hall Company. No speaker has been obtained for the next meeting, but a number of suggestions were offered which the committee will act on in selecting a speaker.

Mild winter weather enabled the Akron Truss Company to complete its new factory and offices in Cuyahoga Falls and occupy them on schedule. Removal from the High Street factory in Akron was made the last week in March, Vice-president B. F. Pease announced. Business continues to improve and the outlook for an exceptionally good year in 1937 is very promising, Mr. Pease said.

Seiberling Latex Products Company announces a new household rubber glove with an attractive novelty. The new product has reinforced finger tips, and is designed to appeal to feminine taste with a color scheme of three colors. The reinforced tips are of different color from the inside or outside color of the glove, which gives the product a three-color effect.

Smaller companies manufacturing tires continue to report business at production capacity, and with orders still arriving at a pace which prevents appreciable cutting down of the amount of back orders. Some of the companies, however, complain that the high prices of rubber and cotton are jeopardizing their profit. The depression strain forbade future rubber commitments which gave others the advantage of low-price buying.

While the strike in the automobile industry has not yet greatly affected the rubber industry in Akron, the fear that it will, together with fear of decentralization, has had an adverse effect on professional business, according to a survey of agencies which handle delinquent accounts for physicians, dentists, etc. The number of delinquents is greater than at the lowest point in the depression and payments are smaller. Lack of money with which to pay is not so great as the fear which grips the purse strings.

CONVENTION FEATURES TWO RUBBER SESSIONS

Two of the forty sessions covering every phase of accident prevention work planned for the Eighth Annual Convention of the Greater New York Safety Council will be devoted to rubber subjects. The Convention is scheduled for April 13th to 15th, inclusive, at the Astor Hotel, New York City. The rubber sessions are regarded as the Eastern Mid-Year Conference of the Rubber Section, National Safety Council.

The first rubber session, under the chairmanship of A. L. Viles, president and general manager, Rubber Manufacturers Association, will be held on Wednesday, April 14th. Three papers will be read, viz: *Safety From the Factory Manager's Point of View*, by Col. A. F. Townsend, chairman of the board, Raybestos-Manhattan, Inc.; *Selecting, Instructing and Training Men*, by T. G. Graham, vice-president, B. F. Goodrich Co.; and *Eliminating Accidents Through Motion and Time Study*, by William R. Mulee, Industrial Engineering Department, American Hard Rubber Company. This session will start at 2:15 P. M.

The second session, under the chairmanship of J. M. Kerrigan, who is chairman of the Rubber Section, National Safety Council, and associated with the Buffalo plant of the U. S. Rubber Reclaiming Corporation, will be devoted to a general round table discussion for those engaged in the rubber and allied industries. Members of these industries are invited to present any perplexing questions pertaining to safety at this session. The round table, which is scheduled to get under way by 10 A. M., on Thursday, April 15th, will be led by Ernest W. Beck, of U. S. Rubber Products, Inc.

The annual dinner of the Convention will be held at the Astor Hotel on Wednesday, April 14th, at 6:30 P. M. Headquarters of the Greater New York Safety Council, Inc., are maintained at 60 East 42nd Street, New York City.

Precision Absorbs Freas

Announcement has been made that the Precision Scientific Company, Chicago, Illinois, is now the sole manufacturer of Freas and Thelco constant temperature laboratory equipment, heretofore built and sold by the Freas Thermo-Electric Company of Irvington, N. J., and Chicago, Ill. All the Freas trade-marks, patents, designs, etc., have been acquired by Precision.

Mansfield Builds Addition

A new five-story addition to the factory of the Mansfield Tire and Rubber Company, Mansfield, Ohio, is rapidly nearing completion. Measuring 80 x 40 feet, the addition is expected to be ready for occupancy in the next few weeks and is expected to cost approximately $100,000, including new equipment which will be housed in it.

Coming Events

Feb. 26. Chicago Group, Rubber Division, A.C.S., Sherman Hotel, Chicago.

March 2. Los Angeles Group, Rubber Division, A.C.S. Mayfair Hotel, Los Angeles.

March 12. Rhode Island Rubber Club, Narragansett Hotel, Providence, R. I.

March 15-17. Annual Convention, N.A.W.M.D., Hotel Sherman, Chicago. (Including Scrap Rubber Institute meetings).

March 19. Akron Group, Rubber Division, A.C.S. Akron City Club, Akron.

March 26. Chicago Group, Rubber Division, A.C.S., Sherman Hotel, Chicago.

April 12-15. Rubber Division A.C.S. Chapel Hill, North Carolina.

April 14-15. Eastern Mid-Year Conference, Rubber Section, National Safety Council. Hotel Astor, New York City.

June 28-July 2. Annual Meeting, A.S.T.M. Hotel Waldorf-Astoria, New York City.

September 13-17. Rubber Division, A.C.S. Rochester, N. Y.

October 11-15. National Safety Council. (26th Safety Congress). Kansas City, Mo.

Dec. 5-11. Exposition of Chemical Industries, Grand Central Palace, New York City.

Order Oak Hill Sale

The plant, property and assets of the Oak Hill Rubber Company, Oak Hill, Ohio, will be offered at public auction on February 27th. The factory, which is appraised at $12,000, is being sold to satisfy judgments amounting to approximately $76,000. William Byrider, Jr., recently was awarded a judgment for $64,285 by the Common Pleas Court at Jackson, Ohio, based on eight notes delivered to his father by Oak Hill in 1926 and which were later endorsed over to him. The State Superintendent of Banks was also recently awarded a judgment of $11,897 against the company.

Kok-Sagiz Yield Improves

Although the average yield of raw material per hectare of Kok-Sagiz, the rubber-bearing plant developed and cultivated in the U. S. S. R., was expected to reach only two tons it surpassed all expectations by reaching 4 tons per hectare, according to reports from the Soviet. During 1937 the area of the Kok-Sagiz plantations in the collective farms of the temperate zone of the country is to be doubled. A factory is currently being constructed in the U. S. S. R. especially designed for the production of rubber from the Kok-Sagiz plants.

FORBES TERMS LABOR "FLY IN OINTMENT"

Describing labor as "the one big fly in the rubber industry's ointment," B. C. Forbes, noted business economist and publisher, recently issued a report wherein he stated that a personal survey of the industry led him to believe that "business in the rubber industry is very good indeed, but—." Calling the "but" a big one, Mr. Forbes deplored labor's proneness to inflict sit-down strikes at any moment, without any warning, in any department.

Pointing out that there had been labor troubles at the Goodyear Akron plant on 94 separate days since March 21, 1936, the economist quoted Paul W. Litchfield, president of Goodyear, as stating that, "Facing such conditions, Goodyear has been forced to look more and more to production facilities outside of Akron." He compared Goodyear's stand on labor to that of General Motors, i.e., "that membership or non-membership in any organization is not now and will not be a condition of employment."

Monsanto Opens Laboratory

On February 2nd, the new laboratory building of the Monsanto Chemical Company, Rubber Service Laboratories Division, at Goodrich and South High Streets, in Akron, Ohio, was formally opened. In a previous issue we referred to this building as a factory, which naturally is erroneous as Monsanto does no manufacturing in Akron, its plant being located at Nitro, West Virginia. The new building will house the division's service compounding laboratories, while all research work will continue at Nitro. Offices of the company remain in the Second National Building, Akron.

Group Insurance for United

The United Carbon Company, Charleston, West Virginia, has made available a group life insurance plan for the benefit of its employees and their dependents. The plan will be underwritten by the Equitable Life Assurance Society of the United States and will be operated on a cooperative basis, United Carbon sharing the cost with its employees. Features of the plan include no age limitation, payment in case of death from any cause, employee cost contributed through payroll deductions, and others.

Plan Factory Expansions

In keeping with Hitler's four-year plan, the Continental Gummiwerke, A.G., is planning several factory expansions for which the sum of RM 12,500,000 (approximately $5,200,000 at the current rate of exchange) has been set aside. A new factory for the production of synthetic rubber is to be erected, as well as a plant for the manufacture of carbon black. The rubber reclaiming factory owned by the company is also to be extended.

CANADIAN GROUP HAS ACTIVE PROGRAM

An ambitious program for 1937 has been laid out by the Rubber Section of the Toronto Chemical Association. This group, which has for its objective practically that of the Rubber Division of the American Chemical Society, was organized last year and held its first meeting on November 20th in Toronto. The group was formed by representatives of rubber and chemical companies in Toronto and was joined by members of the Hamilton Chemical Association interested in rubber technology. Its membership at the present time numbers approximately fifty, including representatives of companies located in Toronto, Hamilton, Kitchener, Galt and one or two other nearby cities.

The first meeting was addressed by W. B. Wiegand, director of research, Columbian Carbon Company, New York City, on the subject of "Reinforcement of Rubber." This paper will be reproduced in the next issue of this journal. Dr. G. S. Whitby, of the National Research Council, Ottawa, discussed "Physical Properties of Raw Rubber" at the second meeting, held at McMaster University, in Hamilton, while "The Manufacture and Uses of Reclaimed Rubber" was given by Dr. H. F. Palmer, Xylos Rubber Company, Akron, at the third meeting. The next meeting is scheduled for February 26th, in Toronto, but to date no speaker has been selected. As a rule, meetings are held each month, alternately in Hamilton and Toronto.

Officers of the Canadian Rubber Group for the 1936-37 season include: R. G. Stewart, Gutta Percha and Rubber, Ltd., chairman; A. Briant, Viceroy Mfg. Company, secretary; and C. L. Brittain, Gutta Percha and Rubber, Ltd., treasurer. Both of these companies are located in Toronto. The program committee includes the chairman, secretary and E. J. Rickard, Canada Wire and Cable Company, and J. C. Howard, Kaufman Rubber Company, Kitchener. C. R. Smye, Firestone Tire and Rubber Company, Hamilton, is president of the Hamilton Chemical Association and an active participant in the new rubber group.

According to Chairman Stewart, the group intends to hold a meeting each month until May and then resume meetings in October or November. He extends a cordial invitation to visitors from the United States at any of these meetings, and is at all times interested in receiving suggestions for suitable papers from American rubber chemists and technologists.

SAMUEL E. DENNIS, of Dallas, Texas, has been promoted to the position of director of replacement sales of the automotive division, Thermoid Rubber Company. He will be stationed at Trenton.

Latex Umbrella Covering

A collapsible umbrella, featuring a replaceable covering made of latex, has been designed and patented by John A. H. Siers, 65 Nassau Street, New York City. In its closed form the umbrella measures only 12 inches in length, but opens up to the standard 35½ inch width. The latex covering is made by dipping and is provided with small hooks around its rim, these hooks sliding over the ends of the ribs in the frame. By this method, replacement coverings may be simply and quickly applied. Ordinary hand pressure forces the latex cover to spread into position when the umbrella is opened, while its natural elasticity brings it back into position when the umbrella is closed. Release of a spring catch causes the umbrella to close. According to Mr. Siers the new type umbrella, which features a colorful catalin handle and is complete to tassel, will be introduced to the market in the near future and will be retailed in a popular price range.

Rubber Safety Officers

Officers for the 1937 season of the Rubber Section, National Safety Council elected during the recent 25th National Safety Congress, held in Atlantic City, include the following: general chairman, J. M. Kerrigan, U. S. Rubber Reclaiming Co., Buffalo, N. Y.; vice-chairman in charge of programs, R. A. Bullock, Corduroy Rubber Co., Grand Rapids, Mich.; secretary, R. W. Morse, Firestone Tire and Rubber Co., Akron; and news-letter editor, Oliver Hopkins, U. S. Rubber Products, Inc., Providence, R. I.

World Two-Way Fair

The World Two-Way Trade Fair, described as the first international exposition of the products and services of foreign trade to be held in the United States, will officially open on May 10th at Commerce Hall in the Port Authority Commerce Building, New York City, and will run to May 22nd. American manufactures of all types which lend themselves to export, including rubber products, will be on exhibit.

JAPANESE EXPORTS SHOW 4.4% DECLINE

Rubber products exported from Japan in the first nine months of 1936 amounted to 31,372,897 yen (approximately $8,790,000), according to the Bureau of Foreign and Domestic Commerce, Washington, D. C., a decline of 4.4% from the 32,814,646 yen (approximately $9,190,000) exported in the comparable period of 1935. A breakdown of the export figures by commodity groups revealed a variety of mixed trends, as follows:

Tires and tubes declined 13.4% in quantity and 1.6% in value, the greatest decrease occurring in tires and tubes for bicycles, with automobile and jinricksha tires and tubes showing a slight increase; mechanical rubber goods increased 44.5% in quantity and 44% in value, an indication that Japanese rubber manufacturers are meeting domestic demand on rubber hose and belting, as well as reaching out to foreign markets; the footwear group, which represents slightly less than one-half of the total value of rubber products, registered a 21.2% loss in quantity and a 15.2% loss in value; miscellaneous rubber products increased 7.6%; a gain of 9.2% was recorded in rubber toys; while a 33% loss was registered on rubber sporting goods.

Goodrich Farm Tire Line

With the addition of several new models and sizes the B. F. Goodrich Company, Akron, has rounded out its line of farm implement tires. These tires are now available in 22 sizes and are designed for use on 474 models of 83 different implements, including binders, combines, corn pickers, harvesters, balers, etc. The growing importance of tires for agricultural equipment is evidenced by the increase in the sale of tires for tractors from less than $1,000,000 in 1933 to more than $9,000,000 in 1936, according to W. C. Bray, manager of the Goodrich truck and bus tire department.

Publishing Delft Papers

English translations of all the papers presented at the recent Rubber Symposium at Delft, Holland, under the auspices of the Colloid Chemistry Section of the Netherlands Chemical Society, will shortly be published in book form by the *India Rubber Journal*, the weekly rubber journal published in London, England. These translations have appeared in recent issues of the publication. The book will sell for 7s. 6d., equal to approximately $1.85 in American money.

May Get Zeppelin Order

Officials of the Goodyear-Zeppelin Corporation, Akron, a subsidiary of the Goodyear Tire and Rubber Company, recently revealed that the company "is ready to start building airships for the U. S. Navy as soon as we get the contract."

CONSUMPTION SHOWS DROP IN DECEMBER

Consumption of crude rubber by manufacturers in the United States for the month of December, 1936, is estimated to be 49,626 long tons, which compares with 50,303 long tons for November, 1936, and 42,474 long tons for December, 1935, according to statistics released by the Rubber Manufacturers Association.

Imports of crude rubber for December are reported to be 57,049 long tons which compares with 44,296 long tons for November and 34,596 long tons for December, 1935.

Total domestic stocks of crude rubber on hand December 31st are estimated to be 218,844 long tons, which compares with 212,515 long tons on hand November 30th and 303,000 long tons on hand December 31, 1935.

Crude rubber afloat to United States ports as of December 31 is estimated to be 56,567 long tons, as compared with 73,691 long tons afloat on November 30 and 39,094 long tons afloat on December 31, 1935.

December reclaimed rubber consumption is estimated at 12,984 long tons; production, 15,938 long tons; and stocks on hand on December 31st, 30,573 long tons.

TIRE SHIPMENTS GAIN BY 3.7% IN NOVEMBER

Shipments of pneumatic casings during the month of November are estimated at 4,232,028 units, an increase of 3.7% over October and 7.7% above shipments made in November, 1935, according to statistics released by the Rubber Manufacturers Association.

Production of pneumatic casings for November is estimated at 4,696,267 casings, a decrease of 3% under October and 24.3% above November, 1935.

Pneumatic casings in the hands of manufacturers, November 30, 1936, are estimated at 10,813,658 units, an increase of 7.2% over the stocks on hand October 31, and 31.1% above stocks on hand November 30, 1935.

The actual figures are as follows:

PNEUMATIC CASINGS

	Shipments	*Production*	*Inventory*
Nov., 1936	4,232,028	4,969,267	10,813,658
Oct., 1936	4,081,023	5,123,467	10,088,510
Nov., 1935	3,930,043	3,997,025	8,249,220
Nov., 1934	3,191,102	3,340,828	8,778,989

Discusses Rubber Research

In another pamphlet issued as part of a series on "Notes on America's Rubber Industry," Paul W. Litchfield, president, Goodyear Tire and Rubber Company, Akron, discusses "How Research in Rubber Contributes to Modern Ways of Living." Pointing out that one hundred years ago rubber was used in only limited quantities, chiefly for waterproof clothing and footwear, Mr. Litchfield credits research with bringing into existence the manufacture of tens of thousands of different articles. He also touches on rubber landmarks, such as the development of a reclaiming process in 1899, the discovery of accelerators in 1906 and use of carbon black and other pigments in rubber compounds in 1916. Revealing that Goodyear established its research and development department in 1908, Mr. Litchfield concludes his summation by predicting that research will lead to safer, stronger and longer-lasting tires in the future.

Acquires Stone Company

American Cyanamid and Chemical Corporation announces that it has acquired the business and factory of Chas. H. Stone, Inc., Charlotte, N. C. Operations of the Charlotte concern will be merged with American Cyanamid's southern district. The acquisition gives the company increased warehouse and production facilities in the south.

Baldwin Loses Patent Suit

Federal Judge Ernest O'Brien, of Detroit, on January 6th, handed down a decision entailing a judgment of $21,000 in favor of the Paine and Williams Company, Clevcland, against the Baldwin Rubber Company, Pontiac, Michigan. The suit entailed patents covering the manufacture of rubber floor mats used in automobiles, and is expected to have a wide effect in the industry. Paine and Williams also have several suits pending against other rubber mat manufacturers.

Replacing Monarch Factory

The Monarch Rubber Company, Baltimore, Maryland, manufacturers of rubber soles and heels, is planning to erect a two-story brick structure to replace the one-story building recently destroyed by fire. Work on the new plant is expected to get under way at an early date, according to Sol Schwaber, head of Monarch.

GENERAL DYESTUFF OPENS NEW LABORATORIES

Open house was held at the new building of the General Dyestuff Corporation at 435 Hudson Street, New York City, on February 3rd, to permit inspection of the modern offices and laboratories by customers and friends of the company. President E. K. Halbach acted as host to the visitors. The building, nine stories in height, has a frontage of 200 feet and a depth of 125 feet, with floor area of 25,000 square feet. The laboratories are on the top or ninth floor, general offices on the floor below, and the remaining seven floors are devoted to warehousing and shipping.

Special attention was given to arrangement, equipment and light in the layout of the laboratories. All textile color research development and testing is done at the north end of the building, the other end being devoted to other fields, including ink, leather, rubber, paper, etc. The offices of the several chemists are in one line across the front of the floor, separated from each other and from the laboratories by glass brick partitions, which transmit 86½% of light. Neutral gray is the dominating color tone throughout the offices and laboratories. The floor of the latter is made of a special acid and alkali-proof tile, while the 17-foot high ceiling is of an acoustical tile which control and absorb sound. Stainless steel was adopted for practically all of the laboratory equipment.

According to Dr. W. H. Cotton, chief chemist, the laboratories serve a triple purpose, viz: to conduct research and set standards and specifications; to develop industrial applications of new dyestuffs and colors; and to help solve customers' problems. Representing the last word in layout and construction, the laboratories lend themselves to completion of these three objectives. General Dyestuff maintains two plants for the production of intermediate, lake and dry colors, and in addition imports some of its materials from foreign sources.

View of the Lake Department in the new General Dyestuff building.

Obituaries

Harry K. Raymond

Harry K. Raymond, who retired in 1925 as vice-president and factory manager of the B. F. Goodrich Company after completing 29 years of service with that company, died at the age of 59 from a series of heart complications in his apartment in the Biltmore Hotel, New York City, on January 10th. Death followed a two-month illness for the major part of which he was under an oxygen tent. A native of Akron, Mr. Raymond joined Goodrich as a worker in the tire division in November, 1896, shortly after being graduated from Central High School. It was in this year that Alexander Winton placed his first order for a pneumatic tire with the company. By May, 1900, he became manager of the bicycle tire department which was later converted into the auto tire division. In July, 1906, he was named assistant general superintendent of the new division and four years later, in 1910, became its manager. Promoted to director of all Goodrich production in December, 1916, Mr. Raymond was elected second vice-president on March 20, 1918, and later to vice-president and factory manager, the positions he held until his resignation in 1925. Since that year he had traveled extensively, spending his Winters in the South. He was a golf enthusiast and was a member of the Portage Country Club, Mayfield Country Club of Cleveland, and others in New York and Miami. He was also a member of the Akron City Club. Funeral services were held on January 13th at his former home in Turkeyfoot Lake, with burial in Glendale Cemetery, Akron. He leaves two sons.

W. B. Ruston

William B. Ruston, one-time head of the Master Tire and Rubber Corporation, and divisional sales manager of the Dunlop Tire and Rubber Company, Buffalo, New York, for the past several years, died at the age of 57 on January 8th after an illness of more than a year. Starting his career in the rubber industry as an errand boy for Goodrich, Mr. Ruston acted in a sales capacity for that company, Lee, Thermoid and Dayton, respectively. Resigning as sales director for Dayton in 1919, he helped form the Master Tire and Rubber Corporation and was appointed president and general manager. He continued as director of sales for Master for several years after the company's activities were placed in the hands of receivers. At the time of his death he was in charge of the Philadelphia division for Dunlop. He was an active Shriner, a member of several lodges. Funeral services were held on January 13th. He leaves a widow, two daughters and a son.

R. S. Burdette

Richard S. Burdette, connected with various departments of the Goodyear Tire and Rubber Company, Akron, for the past seventeen years, died in the Cleveland Clinic Hospital, Cleveland, on January 7th, from a series of internal complications. He was 52 years of age. Born in Edgewater, N. J., Mr. Burdette was graduated from Columbia University as a mining engineer and spent several years in Mexico on engineering work. Shortly after the World War, during which he served as a captain of ordnance, he joined Goodyear's experimental department. At one time he worked on solid tire development and at another served in the rim sales division. In recent years Mr. Burdette had charge of development work on pneumatic industrial and bicycle tires. Funeral services were held at Hummel's Chapel on January 9th, with interment in Mt. Peace Cemetery, Akron. He leaves a widow, a son and a daughter.

L. T. Lyle

Lorin T. Lyle, a member of the legal department of Firestone Tire and Rubber Company for the past 18 years, died at his home, 371 Merriman Road, Akron, following an illness of several weeks, on January 11th. He was 40 years of age. Born in New Holland, Ohio, Mr. Lyle attended preparatory school and matriculated at Ohio State University, being graduated with the law class of 1916. Admitted to the bar in July of that year he immediately joined the law firm of Morton, Ervin and Blanchard in Columbus, Ohio, leaving them in 1919 to join Firestone's legal department as assistant counsel in which capacity he served until his death. In 1933 he visited Liberia, the site of the Firestone plantations, on a legal mission for the company. Funeral services were held on January 14th at St. Vincent's Church with Rev. Joseph Gallagher officiating. He is survived by his widow and a daughter.

J. Mont Miller

J. Mont Miller, associated with the Lee Tire and Rubber Company for the past twenty years, died at his home, 4045 Hudson Drive, Youngstown, Ohio, at the age of 60, last month. Born in Mercer County, Pennsylvania, on November 16th, 1876, Mr. Miller was graduated from Volant College, Volant, Penna., coming to Youngstown in 1893. In 1910 he joined the old Republic Rubber Company and worked in several divisions, including the cost and tire departments. At the time Lee took over Republic Mr. Miller was serving as superintendent of the tire department. He held various jobs with Lee, at one time serving as field director in charge of tire work, later being promoted to managership of the Youngstown Branch. An active Mason he held practically every degree including the 32nd, and served in virtually every office in the order. He was also an active Elk, a member of Youngstown Lodge No. 35. He leaves a widow, three brothers and a sister.

Konrad Dangel

Konrad Dangel, who has been associated with the American Hard Rubber Company for 37 years, died on January 17th at St. Thomas' Hospital in Akron, following an illness of nine months. He was 67 years of age. Born in Germany, Mr. Dangel joined American Hard Rubber shortly after reaching this country. His brother, Joseph, served as superintendent of the Akron factory of the same company for many years. He was an active member of the Knights of St. John, Commandery No. 6 and the Holy Name Society. Funeral services were held on January 20th with burial in Holy Cross Cemetery. He leaves a widow and three sons.

Rubber Associates Formed

A new organization, known as Rubber Associates, Inc., with offices at 342 Madison Avenue, New York City, has been formed to manufacture and market various chemical products and latex and synthetic rubber compounds. The concern, organized by several chemists and engineers familiar with industrial uses of rubber, will act in the capacity of consultants to develop proper compounds and materials for use in fields such as textiles, carpets, highway construction, etc., and in addition will give assistance to companies and individuals desirous of using latex or synthetic rubber in various products or processes. Complete facilities for conducting tests and research activities will be available.

Introduce B-J-F

Described as an accelerator of the thiazole type, especially suitable for use in tire compounds, the Naugatuck Chemical Division of U. S. Rubber Products, Inc., has introduced Accelerator B-J-F. It is an aldehyde amine derivative of mercaptobenzothiazole, said to be easy to handle and economical to use. Further details will appear in an early issue of this journal.

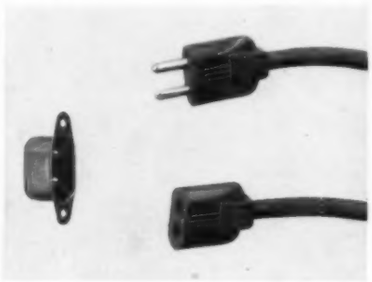
No Mine Deal Intended

According to Goodyear Tire and Rubber Company officials, there is no foundation of fact for recent rumors concerning the probable closing of a deal for mines located in St. Clairsville, Ohio. The probability of such a deal was mentioned in the December issue of this journal.

New Rubber Goods

G-E Appliance Connector

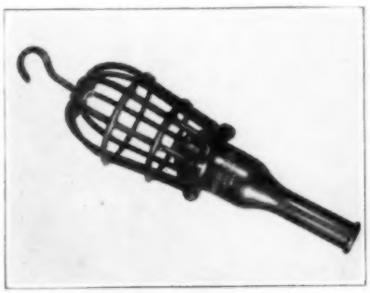
Development of a new appliance connector and a detachable cord set was recently announced by the Accessory Sales Department, General Electric Company,



Bridgeport, Conn. The small metal receptacle is made so that it sets in flush with any appliance or light electrical machine and does not project. The all-rubber connector completes the assembly. An alternative combination offered by the company is a matched all-rubber connector and plug. Dependability and long life is said to be inherent in these all-rubber devices because they are molded into the cord in one piece.

Portable Lamp Guards

Two new types of portable lamp guards have recently been introduced, one featuring an "all-rubber" construction, the other manufactured with a solid rubber handle. The first of these two



Morse Lamp Guard

guards is known as the Eureka "Shokpruf" model, a product of the Frank W. Morse Company, Boston, Mass., combining an insulated portable guard, rubber handle and a rubber socket. It is said to be safe, weather-proof and jar-proof, no metal being exposed at any point. The heavy steel guard is covered with a 1/12th inch thickness of latex, the manufacturer claiming that this is the first time that the latex dipping process has been utilized on an item of this nature. The rubber handle is designed for all sizes of rubber portable cords up to and including ½-inch diameter. The point of wire entry in the handle is designed to grip the wire for watertight closure. It has a soft rubber socket of the pigtail variety with 6-inch leads. All three pieces—guard, handle and socket—are packed in a single carton ready for wiring and assembly.

The second guard, termed the McGill Lamp Guard No. 650, is manufactured by the McGill Manufacturing Company,

McGill Lamp Guard

Valparaiso, Indiana. It features a solid rubber handle which fully protects the user against shorts and shocks, while a molded rubber hook has a steel core which permits the guard to be hung over pipes, cables and similar objects. A pliable, molded rubber socket section is vulcanized securely to the hook, making the entire base a single unit. Bessemer steel wires, electrically welded and cadmium-alloy plated, are used for the cage.

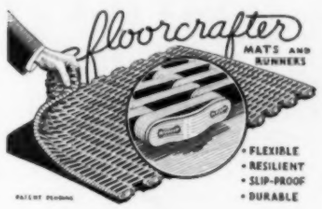
Non-Metallic Gasoline Hose

A new non-metallic gasoline pump hose, known as Type 74, has been announced by the Mechanical Rubber Goods Division of the B. F. Goodrich Company, Akron. The tube of this hose is made from a pure Prenite compound which has a neoprene base. The carcass consists of an outer braid of single end yarn and two inner plies of woven fabric. Between the braid and the

wrapped fabric is a thick secondary tube of rubber in which is embedded a spiral reinforcement of steel wire. Increased gasoline flow is made available with this new hose, according to Goodrich.

Floorcrafter Mats

Marketed under the trade name of Floorcrafter, a new link section mat or runner, which may be rolled or folded in any direction and which conforms to



irregularities of floor surfaces without permanent distortion, is being featured by the Cactus Mat and Patch Mfg. Company, 453 Commercial Street, Los Angeles, California. The mats are constructed of sections of heavy truck tire fabric assembled in link-section formation upon specially treated cord. According to the manufacturer, Floorcrafter mats present slip-proof surfaces, insulate the user from the floor and provide a resilient walking surface. The cord used is treated to make it waterproof, rot-proof and resistant to wear.

Regular Duck Caller

Made completely of hard rubber, the Olt Regular Duck Caller is being mer-

chandised by Philip S. Olt, Pekin, Illinois. Highly polished, the caller is approximately 4¾ inches long and is said to be free from metallic sounds commonly found in other types of callers. Properly used, the Olt caller will produce the natural duck tone or quack, according to the manufacturer, who also features a line of other kinds of callers.

Improved Keyboard Cam Roll

A new type of rubber roll for line-casting machine keyboards, made of sheet rubber, has been developed by Rich and McLean, Inc., New York City. All keyboard cam rolls for the past several decades have been extruded from a mixture of approximately half rubber and half filler materials, in many cases the filler later breaking away from the roll and filling the cams on the keyboard, according to Rich and McLean. This possibility is said to have been eliminated by the new type of roll which is constructed in the following manner: a thin steel shell, split the long way, is covered with rubber, vulcanized, and then ground down to exactly 1.010. The roll is not distorted in any manner when placed on the shaft since the steel shell and not the rubber slides over the shaft. In being applied, the shell opens slightly against the rubber so that it hugs the shaft and cannot creep or move.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, FEBRUARY 9, 1937

Crude Rubber

THE automotive strike, plus indecision as to the action of the International Rubber Regulation Committee with regard to permissible quotas for the second and third quarters of the year, resulted in a declining price for crude rubber on the Exchange in mid-January, prices dropping from 22.38 on January 11th to 20.56 on January 23, high and low for the period covered since our last report. The decision of the Committee, however, which met in London on January 25th, to leave permissible quotas for the second quarter at 80% and to set an 85% quota for the third quarter, both considered inadequate in manufacturing circles, resulted in the price returning to over the 21 cent mark, jumping from 20.56 on January 23rd to 21.06 on January 25th, the following trading day, and rising to 21.32 on January 26th. Dropping slightly since that date, prices have again begun an upward climb in the last few days based on expected early settlement of the automotive strike, following which higher prices are anticipated. Factory purchases are being withheld until settlement of this difficulty. Quotations in the outside market, Exchange, London and Singapore, follow:

As of February 9

Plantations—

Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.21¼
April-June	—	@	.21⅜
July-September	—	@	.21¼
No. 2	—	@	.21⅛
No. 3	—	@	.21⅛
No. 4	—	@	.21⅛
Thin Latex Crepe	—	@	.23⅛
Thick Latex Crepe	—	@	.23⅛
Brown Crepe, No. 1	—	@	.21⅛
Brown Crepe, No. 2	—	@	.21⅛
Amber Crepe, No. 2	—	@	.21⅛
Amber Crepe, No. 3	—	@	.21⅛
Amber Crepe, No. 4	—	@	.21
Brown Crepe, Rolled	—	@	.20¾

Latex—

Liquid Latex, per gal.	.77	@	.78

Paras—

Up-River, fine	—	@	.25
Acre Bolivian, fine	—	@	.25

Balata—

Block, Ciudad	—	@	.30

LONDON MARKET

Standard Smoked Sheets—Buyers—February 9			
April-June	—	@	10 1/32d
July-September	—	@	10 3/32d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—February 9			
April-June	—	@	10 3/32d
July-September	—	@	10 3/32d

Reclaimed Rubber

Since our last report prices have gone up on all grades of reclaim with the exception of truck tire stock, prices on white tire reclaim increasing by 2 cents per pound and floating tube reclaim by 3 cents per pound. Reclaimers report exceptionally heavy demand. The prolonged automotive strike has as yet had little effect on the industry. Still higher reclaim prices are anticipated if the crude rubber increase materializes. Current quotations follow:

Shoe

Unwashed	lb.	.06¾ @	.07
Washed	lb.	.08¼ @	.09

Tube

No. 1 (Floating)	lb.	.19 @	.19¼
No. 2 (Compounded)	lb.	.08¾ @	.09
Red tube	lb.	.08¾ @	.09¼

Tires

Black (acid process)	lb.	.06¾ @	.07
Black, selected tires	lb.	.05¾ @	.06
Dark Gray	lb.	.08 @	.08½
White	lb.	.14 @	.14½
Truck, Heavy Gravity	lb.	.05¾ @	.06¼
Truck, Light Gravity	lb.	.06¼ @	.06½

Miscellaneous

Mechanical blends	lb.	.04¼ @	.04¾

Scrap Rubber

(Delivered Akron Mills)

Scrap prices are down fractionally since our last report despite increasing prices of crude. Tires are down from $1 to $3 a ton and No. 2 and red tubes declined ⅛ to ¼ cent. No. 1 tubes however advanced ½ cent. Demand from reclaimers continues firm. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton	18.75 @	—
Mixed auto	ton	13.00 @	14.00
Beadless tires	ton	16.50 @	17.00
Clean solid truck tires	ton	28.00 @	30.00
Boots and shoes	ton	17.50 @	20.00
Arctics, untrimmed	ton	12.50 @	15.00
Inner tubes, No. 1	lb.	.10½ @	.12½
Inner tubes, No. 2	lb.	.05¼ @	.05½
Inner tubes, Red	lb.	.05¼ @	.05⅜

Cotton

Cotton prices have fluctuated in a 38 point range since our last report, high for the period being 13.33 on January 30th, low being 12.95 on January 21st. The comparatively steady price has been rather puzzling since there are several favorable factors pointing to a better market condition, including the establishment of new high monthly consumption figures by domestic mills, consumption at capacity rate by mills in the Far East and Europe, lack of speculation, settlement of the maritime strike, etc. Cotton has shown no inclination to advance with other commodities, although it is believed that should the Government change its grade differentials the next move will be upward. There is also the possibility of greatly increased exports in the immediate future because of settlement of the maritime strike on both the East and West coasts. Mill agents anticipate a large new demand for cotton goods from the flood areas in the Mid-West when rehabilitation starts, which, if realized, should favorably affect cotton prices. In view of all these angles, an early jump in prices is anticipated. Quotations for middling uplands on the N. Y. Cotton Exchange follow:

	Jan. 11	February 9		
	Close	High	Low	Close
March	12.43	12.67	12.61	12.66
June	12.27	12.54	12.54	12.54
September	11.97	12.08	12.08	12.08

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.34½ @	.35
Peeler, carded, 23/4/3	lb.	.35½ @	.36
Peeler, carded, 15/3/3	lb.	.32½ @	.33
Peeler, carded, 13/3/3	lb.	.31½ @	.32
Egyptian, carded, 23/5/3	lb.	.46½ @	.47
Egyptian, combed, 23/5/3	lb.	.50½ @	.51
CHAFERS			
Carded, American, 1 1/16"	lb.	.34 @	.35
Carded, American, 1"	lb.	.29 @	.33

Sheetings

48x40	36 in.	5.50	lb.	— @	.06¼
40x40	36 in.	6.15	lb.	— @	.06¼
40x36	36 in.	6.50	lb.	— @	.06
48x48	40 in.	2.50	lb.	— @	.12
48x48	40 in.	2.85	lb.	— @	.10¾
56x60	40 in.	3.60	lb.	— @	.09½
48x44	40 in.	3.75	lb.	— @	.08¾
44x40	40 in.	4.25	lb.	— @	.07¾

Ducks

Enameling (single filling)	lb.	.31 @	.33½
Belting and Hose	lb.	.30 @	—
Single filling, A grade	lb.	.13¾ @	.14½
Double filling	lb.	.14¾ @	.15½

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM JANUARY 10 TO FEBRUARY 9

Date	Spot	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Sales
Jan. 10															
11	22.38	22.34	22.39	22.44	22.36	22.27	22.19	22.10	22.07	22.03	21.99	21.98	21.97		260
12	22.06	22.10	22.16	22.21	22.11	22.00	21.92	21.85	21.80	21.75	21.70	21.69	21.68		194
13	21.93	22.02	22.06	22.12	22.04	21.95	21.90	21.84	21.79	21.73	21.70	21.67	21.64		159
14	21.97	22.02	22.04	22.06	21.99	21.92	21.88	21.83	21.78	21.73	21.70	21.68	21.66		288
15	21.88	21.81	21.86	21.91	21.86	21.82	21.77	21.71	21.68	21.65	21.63	21.62	21.61		223
16	21.94	21.95	21.98	22.02	21.97	21.91	21.84	21.77	21.73	21.70	21.66	21.65	21.64		43
17															
18	21.44	21.40	21.45	21.50	21.45	21.40	21.34	21.27	21.22	21.17	21.14	21.12	21.10		173
19	20.68	20.68	20.71	20.75	20.73	20.70	20.65	20.61	20.61	20.60	20.59	20.58	20.57		433
20	21.18	21.13	21.18	21.23	21.19	21.14	21.11	21.08	21.04	21.00	21.00	20.98	20.95		211
21	20.93	20.87	20.92	20.97	20.97	20.96	20.92	20.88	20.87	20.85	20.82	20.80	20.78		110
22	20.65	20.58	20.63	20.68	20.63	20.62	20.61	20.59	20.57	20.66	20.53	20.51	20.48		179
23	20.56	20.57	20.61	20.65	20.63	20.60	20.57	20.55	20.53	20.50	20.48	20.46	20.44		98
24															
25	21.06	21.05	21.10	21.15	21.13	21.12	21.08	21.05	21.03	21.01	21.00	20.97	20.95		293
26	21.32	21.30	21.35	21.40	21.38	21.35	21.30	21.25	21.23	21.20	21.18	21.16	21.14		273
27	21.06	——	21.03	21.08	21.06	21.03	21.02	20.96	20.94	20.92	20.90	20.87	20.85		176
28	21.07	——	21.06	21.11	21.09	21.08	21.06	21.04	21.00	20.97	20.93	20.90	20.87		190
29	21.12	——	21.08	21.12	21.12	21.11	21.07	21.03	20.99	20.95	20.94	20.91	20.88		289
30	21.06	——	21.01	21.06	21.06	21.07	21.03	21.00	20.97	20.95	20.92	20.91	20.90		42
31															
Feb. 1	21.00	——	21.03	21.08	21.07	21.06	21.03	21.00	20.98	20.97	20.94	20.93	20.92	20.91	66
2	21.00	——	20.95	21.00	21.00	21.00	20.98	20.96	20.94	20.92	20.90	20.88	20.86	20.84	80
3	21.03	——	21.06	21.11	21.11	21.11	21.08	21.06	21.04	21.02	21.00	20.98	20.96	20.94	143
4	21.25	——	21.29	21.34	21.34	21.34	21.32	21.29	21.29	21.29	21.27	21.26	21.25	21.24	240
5	21.41	——	21.40	21.43	21.43	21.44	21.42	21.41	21.41	21.40	21.38	21.37	21.36	21.35	279
6	21.47	——	21.47	21.50	21.50	21.50	21.50	21.50	21.48	21.46	21.44	21.43	21.42	21.41	51
7															
8	21.50	——	21.50	21.53	21.53	21.55	21.55	21.55	21.55	21.55	21.54	21.54	21.53	21.52	176
9	21.28	——	21.26	21.29	21.29	21.33	21.33	21.32	21.31	21.30	21.30	21.29	21.28	21.27	166

Rubber CHEMICAL Markets

NEW YORK, FEBRUARY 11, 1937

[All Quotations F.O.B. Works Unless Otherwise Noted]

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.24 @	.28
A-5-10	lb.	.33 @	.36
A-7	lb.	.53 @	.65
A-11	lb.	.60 @	.75
A-16	lb.	.55 @	.65
A-19	lb.	.56 @	.75
A-32	lb.	.70 @	.80
A-77	lb.	— @	—
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	— @	—
Captax	lb.		
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.44 @	.47
Diphenylguanidine	lb.	.35 @	.37
El-Sixty	lb.	.55 @	.65
Ethylidene aniline	lb.	.45 @	.47½
Formaldenyde aniline	lb.	.37½ @	.42
Guantal	lb.	.42 @	.51
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.37 @	—
Lead Oleate, No. 999	lb.	.12 @	—
Witco	lb.	.12 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	3.25 @	—
Oxynone	lb.	.68 @	.80
Phenex	lb.	.50 @	.55
Pipsolene	lb.	1.60 @	1.85
R & H 40	lb.	.40 @	.41
R & H 50	lb.	.40 @	.41
R-2	lb.	1.50 @	1.80
Safex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.		
No. 2	lb.		
Thiocarbanilid, drums	lb.	.24 @	.28
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.60
Tuads	lb.		
Ureka	lb.	.62 @	1.00
Ureka B	lb.	.62 @	.75
Ureka C	lb.	.58 @	.69
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z-88-P	lb.	.48 @	.60
Zimate	lb.		
Inorganic			
Litharge, domestic	lb.	.07½ @	.08½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)			
Blues			
Prussian	lb.	.37 @	.39
Ultramarine	lb.	.15 @	—
Browns			
Sienna, Italian	lb.	.06 @	'13
Umber, Turkey	lb	.04 @	.04½
Greens			
Chrome, light	lb.	.20 @	.30
medium	lb.	.21 @	.31
Chromium Oxide, bbl.	lb.	.19 @	.20
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	.48 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone CB, No. 21	lb.	.05¾ @	.06
Cryptone, No. 19	lb.	.05¾ @	.06
Cryptone, ZS-20	lb.	.09 @	.09¼
Cryptone, ZS-86	lb.	.09 @	.09¼
Lithopone			
Albalith, black label—11 lb.		.04¼ @	.04½
Azolith	lb.	.04¼ @	.04½
Rayox	lb.		
Titanox A	lb.	.16 @	.16¾
Titanox B	lb.	.05¾ @	.06
Titanox C	lb.	.05¾ @	.06
Zinc Oxide—American Process			
American Azo			
ZZZ (lead free)	lb.	.05¼ @	.05½
Anaconda, lead free	lb.	.05¼ @	.05½
Horsehead Lead Free Brand:			
Special—3	lb.	.05¼ @	.05½
XX Red—4	lb.	.05¼ @	.05½
XX Red—72	lb.	.05¼ @	.05½
XX Red—78		.05¼ @	.05½
XX Red—103	lb.	.05¼ @	.05½
U. S. P.—7, bbls.	lb.	.05¼ @	.05½
Kadox, black label—15	lb.	.05¼ @	.05½
Blue label—16	lb.	.05¼ @	.05½
Red label—17	lb.	.05¼ @	.05½
St. Joe, black label	lb.	.05¼ @	.05½
green label	lb.	.05¼ @	.05½
red label	lb.	.05¼ @	.05½
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	.06¾ @	.07
Green seal—8	lb.	.06¼ @	.06½
Red seal—9	lb.	.05¾ @	.06
Yellows			
Chrome	lb.	.11 @	.12
Ocher, dom. med.	lb.	.02¾ @	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0535 @	.0825
Bone, powdered	lb.	.05½ @	.12½
Carbon, compressed	lb.	.0535 @	.0825
uncompressed	lb.	.0535 @	.0825
"Certified," Cabot	lb.	.0535 @	.0825
Spherons	lb.	.0535 @	.0825
"Disperso"	lb.	.0535 @	.0825
Drop, bbls.	lb.	.05½ @	.14
"Excello," compressed	lb.	.0535 @	.0825
"Fumonex"	lb.	.03 @	.07
"Gastex"	lb.	.03 @	.07
Lampblack	lb.	.07 @	.12
"Micronex"	lb.	.0535 @	.0825
"Supreme"	lb.	.0535 @	.0825
Thermatomic—"P 33"	lb.	— @	—
"Thermax"	lb.	— @	—
United "Dixie" & "Kosmos"	lb.	.0535 @	.0825

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	13.00 @	15.00
Barium carbonate (98-100%)	ton	56.50 @	61.50
Barium Dust	lb.	.05 @	.06
Barytes	ton	23.65 @	31.15
Basofor	lb.	.04½ @	—
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	70.00 @	75.00
Calcene	ton	37.50 @	45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40 @	60.00
heavy	ton	45.00 @	55.00
Clay, Kaolin, domestic	ton	7.50 @	15.00
Aerfloted, Suprex	ton	8.50 @	10.00
Congaree	ton	9.00 @	—
Dixie	ton		
Dixie, Jr.	ton		
McNamee	ton		
Par	ton		
Tensulite		15.00 @	—
Witco	ton	8.50 @	9.00
Cotton Flock	lb.	.11 @	.15
Glues, extra white	lb.	.28 @	.30
medium white	lb.	.14 @	.19
Kalite No. 1	ton	30.00 @	55.00
Kalite No. 3	ton	40.00 @	65.00
Magnesium carbonate	lb.	.08 @	—
Mica	ton	35.00 @	—
Pyrax A	ton	— @	—
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00 @	22.00
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	16.00 @	18.00
Whiting, commercial	ton	17.00 @	18.00
Columbia Filler	ton	9.00 @	14.00
English Cliffstone	ton	33.00 @	43.00
Sussex	ton		
Witco	ton	7.00 @	—
Wood Flour	ton	18.00 @	30.00
Zinc Carbonate	lb.	.10½ @	.11
Zinc Stearate	lb.	.27 @	—

MINERAL RUBBER

Black Diamond	ton	27.00 @	—
Genasco, solid (factory)	ton	25.00 @	27.00
Hard Hydrocarbon	ton		
Parmr, solid	ton	25.00 @	—
Pioneer, MR, solid	ton		
Pioneer-granulated	ton		

SPECIALTIES

Aromatics—Rodo	lb.		
Para-Dors No. 5145	lb.	2.00 @	—
Sunproof	lb.	.35 @	.37½
Sponge Paste	lb.	— @	.80
Tonox	lb.	.56 @	.60

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.45 @	2.70
Nitric, 36 degrees	cwt.	5.00 @	6.00
Sulfuric, 66 degrees	ton	15.50 @	16.50
Acids, Fatty			
Laurex	lb.	.1[illegible] @	.16
Stearex Beads	lb.	.10½ @	.11
Stearic, double pressed	lb.	.11½ @	.12½
Stearite	lb.	.10½ @	.11½
Alkalies			
Caustic Soda, 76%	cwt.	3.05 @	—
Soda Ash, 58% C.L.	cwt.	1.25 @	—

Oils

Corn, refined, bbls.	lb.	.12¾ @	—
Cottonseed, crude	gal.	.09[illegible] @	.10
Cycline Oil	gal.	.15 @	.28
Degras, bbls.	lb.	.07¾ @	.08
Fluxrite	lb.	.05½ @	.06½
Palm Lagos	lb.	.06 @	—
Niger	lb.	.06½ @	.06¾
Para-Flux	gal.	.17 @	—
Petrolatum, light	lb.	.03½ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22 @	.23½
Pine, steam distilled	gal.	.64 @	.65
dest. dist., drums	gal.	.50 @	—
Rosin Oil, cmpd	ga.	.40 @	—
Rubtack	lb.	.08 @	.10
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.07 @	—
Witco Softener	gal.	.18 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.03½ @	—
coal tar	gal.	.07½ @	.08
hardwood	ton	15.00 @	—
pine, 200 lb. gr. wt.	bbl.	5.00 @	5.25
Rosin, grade K, 280 lb.	bbl.	10.95 @	—
Pigmentar, tank cars	gal.	.19 @	—
in drums	gal.	.25 @	.27
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	bbl.	12.00 @	13.00
Solvents			
Acetone, pure	lb.	.06 @	—
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.28 @	.39
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	—
Bondogen	lb.	— @	—
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon, tetrachloride	lb.	.05¾ @	—
Dichlorethylene	lb.	.29 @	—
Dipentene, cml., drums	gal.	.41 @	.44
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Ethylene dichloride	lb.	.05½ @	.06½
Gasoline, steel bbls.	gal.	.16 @	—
Naphtha, solvent	gal.	.31 @	—
Plastogen	lb.		
Reogen	lb.		
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene	lb.	@	.09½
Turpentine, spirits	gal.	.50 @	—
dest. dist., drums	gal.	.47 @	—
Waxes			
Beeswax, white	lb.	.38 @	.40
Carnauba, yellow	lb.	.46 @	.47½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¾ @	.11¾
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.03½ @	—
White crude scale 124/126	lb.	.03 @	—
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

AgeRite, Gel	lb.		
HP	lb.		
Powder	lb.		
Resin	lb.		
White	lb.		
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Flectol-H	lb.	.54 @	.65
Flectol White	lb.	.95 @	1.15
Flectol B	lb.	.54 @	.65
Neozone	lb.		
Oxynone	lb.	.66 @	.75
Perfectol	lb.	.67 @	.75
Retardex	lb.	.35 @	.40
Santoflex A	lb.	— @	—
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.60

MOLD LUBRICANTS

Aresklene	lb.	— @	—
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.09
Lubrex	lb.	.25 @	.30
Rusco, f.o.b. Nitro	lb.	.12 @	.30
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.23 @	—
Black	lb.	.08½ @	—
White	lb.	.095 @	.15
Brown	lb.	.095 @	.14
Neophax	lb.	.13 @	—

VULCANIZING INGREDIENTS

Sulfur Chloride, yellow (drs.)	lb.	.03½ @	.04½
Sulfur flour.			
Refined, 100% pure (bags)	cwt.	2.55 @	3.15
Commercial (bags)	cwt.	1.60 @	2.35
Telloy	lb.		
Vandex	lb.		

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Total Declared Value	Average Declared Value per pound Cents	Re-exports: Long Tons	Total Declared Value	Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,362	185,060,304	26.71	8,772	5,672,319	28.87	300,590
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1935:							
March	45,350	11,801,152	11.62	1,868	486,379	11.62	43,482
April	39,735	10,096,487	11.34	1,096	285,903	11.64	38,639
May	29,278	7,171,025	10.98	793	202,402	11.39	28,485
June	31,240	7,523,598	10.75	524	153,595	13.10	30,716
July	46,987	11,666,577	11.08	489	132,173	12.06	46,498
August*	40,275	10,422,625	11.55	476	130,464	12.23	39,799
Sept.	34,659	8,637,048	11.12	468	120,438	11.48	34,191
Oct.	35,091	8,742,222	11.12	651	188,518	12.92	34,440
Nov.*	25,155	6,164,454	10.94	380	101,793	11.95	24,775
Dec.	38,417	9,930,710	11.54	1,821	523,997	12.85	36,596
1936:							
Jan.*	32,310	8,637,997	11.94	733	229,129	13.98	31,577
Feb.	32,879	9,293,711	12.62	625	199,956	14.27	32,254
Mar.*	33,447	9,845,776	13.14	1,172	390,551	14.88	32,275
Apr.*	44,218	13,967,712	14.10	984	343,785	15.59	43,234
May*	35,578	11,460,157	14.38	1,589	580,021	16.30	33,989
June	36,376	12,073,632	14.82	2,469	904,669	16.35	33,907
July	38,178	12,763,200	14.92	1,383	510,075	16.47	36,795
Aug.	40,027	13,364,916	14.91	840	307,114	16.32	39,187
Sept.*	48,368	16,691,919	15.41	656	244,554	16.64	47,712
Oct.	39,573	13,627,465	15.37	778	268,645	15.42	38,795
Nov.*	36,798	12,790,306	15.52	675	241,982	15.99	36,123
Dec.	49,312	17,555,705	15.89	677	267,745	17.65	48,635

* Revised.

Note: Annual figures for 1922-1936 revised on basis of information received on February 8, 1937. Figures for 1922 and 1923 include latex; guayule is included only in 1922.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule: Tons	Dollars	Balata: Tons	Dollars	Jelutong: Tons	Dollars	Liquid Latex (1): Tons	Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1936:								
Jan.	70	13,182	30	8,924	656	133,948	1,667	474,682
Feb.	75	14,127	100	34,389	396	84,635	1,459	406,985
Mar.	40	7,605	65	25,590	378	70,560	1,427	417,704
April	103	19,469	38	15,232	751	146,548	1,612	522,049
May	88	16,698	59	21,217	521	114,099	1,472	490,769
June	97	18,380	33	13,671	767	186,274	1,897	657,311
July	96	18,168	44	15,314	556	106,676	1,665	579,895
Aug.	146	37,147	72	23,715	321	64,769	1,761	602,992
Sept.	106	29,335	21	9,846	418	85,624	1,800	692,810
Oct.	114	31,489	11	4,815	452	102,485	1,392	500,817
Nov.	159	43,980	43	19,408	405	91,538	1,631	578,729
Dec.	134	36,972	14	7,247	538	109,208	2,070	735,156

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

(All Quantities in Long Tons)

Figures on Monthly Basis

	1929	1930	1931	1932	1933	1934	1935	1936
Jan.	43,002	36,194	28,557	29,648	22,645*	39,190*	46,636*	48,506
Feb.	41,594	33,302	28,797	31,821	21,392*	40,515*	42,720*	36,746
Mar.	44,730	35,540	32,788	29,505	17,483*	47,003*	42,153*	42,703
Apr.	47,521	39,686	33,321	27,518	25,928	44,853*	44,247*	51,897
May	49,233	39,386	37,817	30,957	44,074	42,918*	41,101*	50,482
June	43,227	34,195	37,916	41,475	50,743*	40,147*	36,156*	52,636
July	41,526	29,508	31,397	29,976	49,614*	32,553*	35,917*	48,127
Aug.	38,274	30,850	27,586	23,721	44,428*	33,216*	38,775*	46,657
Sept.	34,707	25,515	23,638	23,847	35,281*	30,258*	37,086*	46,330
Oct.	34,800	27,516	22,277	22,286	31,543*	31,253*	41,969*	49,509
Nov.	27,659	23,691	22,943	23,231	28,831*	34,748*	42,310*	50,303
Dec.	25,531	21,687	21,409	18,015	28,757*	36,569*	42,474*	49,626
Tot.	469,804	375,980	348,986	332,000	400,719*	453,223*	491,544*	573,522

* Revised.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	% to Crude	Stocks*	Year	Production	Consumption: Tons	% to Crude	Stocks*
1927	189,144	178,471	47.6	24,980	1932	75,608	77,504	23.4	16,354
1928	208,516	223,000	50.4	24,785	1933	99,560	81,602	19.9	20,746
1929	218,954	226,589	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,001	1935	122,948	113,078*	23.0a	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	130,048	22.7	30,573

Figures on Monthly Basis

	Production	Tons	% to Crude	Stocks*		Production	Tons	% to Crude	Stocks*
1935:									
Jan.	10,465	11,261	23.9	22,291	July	8,421	8,395	23.4a	17,810
Feb.	10,072	9,376	23.3	22,989	Aug.	9,557	8,795	22.7a	18,272
Mar.	10,549	9,742	22.9	20,637	Sept.	9,041	8,764	23.6a	18,260
Apr.	10,315	10,466	23.7a	18,716a	Oct.	11,926	9,662	23.0a	19,640
May	10,223	9,939	24.2a	18,541	Nov.	11,482	9,084	21.2	21,478
June	8,590	8,711	24.1a	17,932	Dec.	12,307	8,523	19.8	25,069
1936:									
Jan.	11,665	10,039	20.7	26,145	July	12,330	11,816	24.6	22,602
Feb.	10,188	7,366	20.1	28,267	Aug.	12,856	10,993	23.6	23,750
Mar.	10,712	8,767	20.5	29,161	Sept.	12,959	11,170	24.1	24,950
April	11,382	10,333	19.9	22,274	Oct.	14,737	12,606	25.7	26,389
May	11,512	10,398	20.6	22,852	Nov.	14,357	12,029	23.8	28,135
June	11,935	11,547	21.9	22,738	Dec.	15,938	12,984	26.2	30,573

* Stocks on hand at the end of month or year.
a Revised.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)

(In Thousands of Barrels of 42 Gallons)

	1935	1936	1937		1935	1936	1937
January	28,147*	32,553	.....	August	43,097*	46,081	.....
February	26,580*	27,216*	.....	September	37,976*	44,346	.....
March	32,272*	35,871	.....	October	41,566*	44,253	.....
April	36,363*	38,825	.....	November	35,991*	39,919	.....
May	39,381*	42,007	.....	December	33,872*	.....	.....
June	38,086*	44,630	.....				
July	41,479*	46,638*	.....	Total	434,810*	.....	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1925	26,001,664	1929	24,141,502	1933	8,713,962
1926	24,199,524	1930	17,364,096	1934	12,255,118
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,098

1936:		1936:		1936:	
January ...	1,877,448	May	1,959,425	September ..	1,104,404
February ..	1,260,590	June	1,876,446	October ...	1,846,750
March	1,840,723	July	1,716,463	November ..	2,173,408
April	2,258,296	August	934,595	December ..	1,941,550

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1934																																
October	14½	14½	13⅜	14	13⅜				13⅝	13⅞	14⅜				13⅞	14⅜	14⅞	14⅝	14⅞	14	12½		14⅞	14⅜	13⅞	13⅞	13⅞			13¾	13	14—
November	13⅝	13⅝	13		13		13⅜	13¾	13¾	13¾			13⅞	13⅞	13⅞	12⅞	13		13	12¾	12½		12⅜	12⅜		13⅞	13⅞	13⅞	13	13⅜		13
December			12⅞	13	13	13⅜	13⅜			12⅛	12⅞	12⅛	12⅛	12⅛					13	13	12⅛		12⅛	12⅛		12⅞	12⅞	12⅞	13	13⅜		—13
1935																																
January	13⅝	13½	13½	13½	13½			13¾	13⅝	13⅜	13⅜	13¼			12⅞	13⅛	13⅛	13⅛	13		13	12⅛	12⅜	12⅛	13⅜	12⅜	12⅜	12⅛	12⅛	12⅜	12⅜	13⅜
February	12¾	12¾	12¾	12¾	12¾	12⅝	12⅝	13⅛	13⅛		13		13	13	13	13⅛		10⅝	10⅛	10⅛	10⅜	13⅜	10⅛			12⅝	12⅝	11⅞	11½	12⅝	12⅝	12⅞
March	12⅝		12⅝	12⅝	12⅛	12⅛	12⅛	12⅝			11¾	11¾		11½	11		11⅛	11⅛	11⅛	11⅛	11⅛		10⅛	10⅛		11⅜	11⅜	11⅜	11⅛	11⅛			11½
April	11⅜	11⅜	11⅜	11⅛	11	11	10⅝		11½	11½	11⅜	11½	12	12⅛	12	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	11½
May	11⅞	11½	11⅝	11½	12½	12⅝	11⅝	11⅝	11⅝	11⅝	11⅝	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12
June	12⅛	12⅛	12¼		12½		12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛
July	12⅛	12⅛	12¼	12½	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝
August	12⅛	12⅛	12¼	11⅝	11⅝	11⅝	11⅝	11⅝	12	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛
September	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜
October	11⅜	11⅜	11⅜	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
November	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼
December	13¼	13¼	13¼	12⅞	13⅛	13⅛	13⅛	13⅛	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
1936																																
January	13½	13½	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
February	15⅛	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝
March	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝
April	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
May	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
June	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
July	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Aug.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Sept.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Oct.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Nov.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Dec.	18½	18½	18⅝	19	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛
1937																																
Jan.				20⅞	20¾	21⅛	21⅛	21⅛	22⅛		22¾	22⅛																				
Feb.	21		21⅛	21¼	21⅛	21½																										

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1929

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15	1922	17.50	1926	48.50
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	37.72
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.55

Average Monthly Price per Pound Since 1930

	1930 Cents	1931 Cents	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents
Jan.	15.24	8.34	4.38	3.08	9.32	13.10	14.35	21.37
Feb.	15.85	7.70	4.03	2.95	10.45	12.92	15.48	
Mar.	15.34	7.71	3.35	3.01	11.01	11.51	15.89	
Apr.	14.93	6.43	3.02	3.56	12.10	11.55	15.98	
May	14.24	6.49	3.09	4.95	13.26	12.05	15.62	
June	12.45	6.35	2.66	6.15	13.51	12.57	15.85	
July	11.24	6.37	2.89	8.01	14.60	12.10	16.49	
Aug.	9.96	5.38	3.63	7.31	15.47	11.98	16.25	
Sept.	8.28	5.08	3.84	7.30	15.36	11.55	16.46	
Oct.	8.20	4.87	3.65	7.64	13.96	12.62	16.55	
Nov.	9.01	4.65	3.44	8.66	13.04	13.15	17.97	
Dec.	9.05	4.64	3.24	8.87	12.98	13.28	20.01	
Average for Year	11.98	6.17	3.49	5.96	12.92	12.37	16.41	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1936 Nov.	1936 Dec.	1937 Jan.	1937 Feb.	Day	1936 Nov.	1936 Dec.	1937 Jan.	1937 Feb.
1		8		10 3/16	17	8 1/4	9 3/16		
2	8 1/4	8 7/16		10 3/16	18	8 1/4	9 1/16	10 1/2	
3	8 1/4	8 7/16		10 3/16	19	8 5/16	9 1/16	10 1/4	
4	8 1/16	9	9 3/4	10 3/16	20	8 1/16		10 1/16	
5	8 1/16	9 1/16	10	10 1/2	21	8 1/16	9 7/8	10 1/16	
6	8 1/16		10 1/16	10 5/8	22		9 7/8	10 5/8	
7	8 1/16	9 1/16	10 3/8		23	8 5/8	10 1/16	10 5/8	
8		9 1/16	10 1/16	10 5/8	24	8 5/8	10 3/8		
9	8 1/16	9	10 1/16	10 7/16	25	8 1/2		10 1/4	
10	8 5/8	9 1/16			26	8		10 1/2	
11	8 9/16	9 1/16	10 1/2		27	8		10 1/4	
12	8 1/2	8 7/16	10 1/16		28	8	11 7/8	10 5/16	
13	8 1/2		10 3/4		29		10 13/16	10 7/16	
14	8 5/8	9	10 1/8		30	8 3/4	10 7/16	10 7/16	
15		9 3/8	10 3/4		31		10 7/16		
16	8 5/8	9 1/16	10 5/8						

Average Monthly Price Per Pound

Month	1934 Pence	1935 Pence	1936 Pence	1937 Pence	Month	1934 Pence	1935 Pence	1936 Pence	1937 Pence
Jan.	4.429	6.434	6.758	10.378	Aug.	7.401	5.696	7.581	
Feb.	4.920	6.292	7.255		Sept.	7.409	5.508	7.577	
Mar.	5.136	5.745	7.450		Oct.	6.806	6.130	7.898	
Apr.	5.712	5.604	7.502		Nov.	6.294	6.308	8.572	
May	6.207	5.822	7.335		Dec.	6.295	6.340	9.580	
June	6.245	6.027	7.352		Average for				
July	7.053	5.801	7.696		Year	6.159	5.976	7.713	

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1936 Dec.	1937 Jan.	1937 Feb.	Date	1936 Dec.	1937 Jan.	1937 Feb.	Date	1936 Dec.	1937 Jan.	1937 Feb.
1	12.58		13.29	11	12.87	13.03		22	12.71	12.97	
2	12.63		13.25	12	12.98	13.09		23	12.83	12.97	
3	12.64		13.30	13		13.06		24	12.99		
4	12.64	12.91	13.25	14	13.03	13.01		25			12.98
5	12.56	12.91	13.20	15	12.92	13.04		26			13.07
6		12.96	13.21	16	12.92	13.07		27			13.22
7	12.60	13.07		17	12.75			28	13.11		13.30
8	12.71	13.01	13.16	18	12.80	13.08		29	12.95		13.28
9	12.84	13.06	13.16	19	12.81	13.04		30	13.04		13.33
10	12.98			20		12.98		31	13.00		
				21	12.78	12.95					

Average Monthly Price Per Pound

	1934 Cents	1935 Cents	1936 Cents	1937 Cents		1934 Cents	1935 Cents	1936 Cents	1937 Cents
Jan.	11.25	12.70	11.91	13.06	Aug.	13.40	11.48	12.28	
Feb.	12.28	12.58	11.53		Sept.	13.00	10.80	12.31	
Mar.	12.30	11.63	11.43		Oct.	12.48	11.28	12.30	
Apr.	11.80	11.73	11.71		Nov.	12.53	12.01	12.23	
May	11.44	12.25	11.68		Dec.	12.76	11.99	12.83	
June	12.20	11.89	12.02		Average for				
July	12.84	12.26	13.11		Year	12.36	11.88	12.11	

World Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND 1934	ON HAND 1935	ON HAND 1936	AFLOAT 1934	AFLOAT 1935	AFLOAT 1936	ON HAND AND AFLOAT 1934	ON HAND AND AFLOAT 1935	ON HAND AND AFLOAT 1936
Jan.	370,039	349,446	285,054*	45,768	42,066	43,870	415,807	391,512	328,924*
Feb.	358,423	340,264	282,902*	53,063	42,969	46,532	411,486	383,233	329,434*
Mar.	353,078	340,284	276,823*	54,722	44,485	58,935	407,800	384,769	335,758*
Apr.	351,073	337,586	264,228*	56,251	37,651	47,678	407,324	375,237	311,906*
May	350,935	322,558	248,317	57,921	44,375	48,860	408,856	366,933	297,177
June	358,461	324,218	245,886	46,698	55,581	47,228	405,159	379,799	293,114
July	365,072	334,692	234,498	45,869	49,018	60,343	410,941	383,710	294,841
Aug.	363,711	334,106	229,056	40,278	47,724	63,597	403,989	381,830	292,653
Sept.	360,623	331,121	228,477	38,831	43,413	62,240	399,454	374,534	290,717
Oct.	362,571	322,857	219,553	38,247	49,913	67,825	400,818	371,770	287,378
Nov.	362,826	308,993	212,515	38,625	46,588	73,691	401,451	355,581	286,206
Dec.	355,000	303,000	218,844	47,644	39,094	56,567	402,644	342,094	275,411

(Rubber Manufacturers' Association figures raised to 100%)

* Revised.

Note: Complete figures for 1934 and 1935 were revised by the R.M.A. on May 1, 1936.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1934	London 1935	London 1936	Liverpool 1934	Liverpool 1935	Liverpool 1936
January	38,570	81,807	84,791	51,702	66,405	77,188
February	38,752	87,605	79,757	52,730	67,983	77,138
March	40,501	92,664	74,779	53,813	69,218	72,823
April	42,413	94,361	68,932	53,695	70,584	71,388
May	42,190	95,722	61,349	54,007	71,927	69,150
June	45,674	98,077	55,993	54,028	73,131	66,173
July	50,490	99,226	49,575	55,414	74,915	63,715
August	48,953	101,574	45,749	56,246	75,584	62,367
September	56,193	101,198	44,364	56,848	76,263	59,485
October	63,079	94,749	40,777	57,818	76,400	55,738
November	67,656	90,542	37,495	60,106	76,301	51,184
December	72,285	86,551	33,027	62,505	77,589	55,291

(*Figures from the Rubber Trade Association of London*)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

At end of 1936	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
January	31,195	35,231*	4,504*	1,568	4,496
February	38,421	34,109	4,475	1,532	6,199
March	29,322	31,723	3,866	1,547	4,864
April	32,200	34,090	3,123	1,497	4,873
May	26,687	33,179	3,379*	1,360	4,522
June	28,260	34,166	3,057	1,070	4,502
July	29,443	34,395	3,610	1,026	4,696
August	28,289	34,849	3,961	979	1,742*
September	26,936	33,351	3,930	911	1,817
October	24,593	34,941	3,490	773	1,820
November	26,761		3,415		1,948

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

End of:	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
1935				
December	39,094	25,200	18,706	83,000
1936:				
January	43,870	20,160	19,970	84,000
February	46,532	18,690	19,778	85,000
March	58,935	16,820	14,245	90,000
April	47,678	17,025	18,297	83,000
May	48,860	18,670	21,470	89,000
June	47,228	20,200	22,572	90,000
July	60,343	20,300	25,357	106,000
August	63,597	19,800	15,603	99,000
September	62,240	18,090	15,670	96,000
October	67,825	20,790	17,385	106,000
November	73,691	20,000	12,309	106,000
December	56,567	20,000P	28,433	105,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate.

TOTAL WORLD STOCKS

(Figures from the Survey of Current Business)

At end of	1931	1932	1933	1934	1935	1936
January	510,296	623,416*	634,797	661,948	698,153	600,479*
February	516,123	611,819*	626,227	663,308	686,195	599,355*
March	532,080	614,894*	638,428	666,382	678,809	574,594*
April	531,832	615,893*	629,159	658,796	677,006	558,583
May	528,855	612,474*	626,537	689,239	677,569	533,411*
June	533,021	595,712	613,055	672,804	671,525	511,931*
July	548,794	589,037	618,258	676,200	679,061	510,873*
August	555,931	597,274	617,449	674,702	680,644	492,439*
September	561,838	599,986	623,683	694,361	661,509	485,488*
October	588,873	609,368	636,597	680,616	655,000	476,190*
November	605,684	614,342	642,968	684,408	617,300*	460,500
December	628,826	629,898	654,890	705,975	613,987*	
Monthly Average	553,513	609,502*	630,171	677,395	666,397*	

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1928	1929	1930	1931	1932	1933	1934	1935
Production	77,944	68,726	50,965	48,740	40,085	45,303	47,233	49,362
Shipments	74,296	69,395	53,638	50,061	40,251	44,094	46,597	50,183
Inventory [2]	13,624	11,838	9,003	7,775	7,644	8,888	9,455	8,196

Figures for Recent Months

	PRODUCTION 1934	PRODUCTION 1935	PRODUCTION 1936	SHIPMENTS 1934	SHIPMENTS 1935	SHIPMENTS 1936	INVENTORY 1934	INVENTORY 1935	INVENTORY 1936
Jan.	3,922	4,626	4,579	3,222	3,663	3,875	9,684	10,398	8,917
Feb.	4,335	4,383	3,577	3,285	3,287	3,211	10,725	11,530	9,263
Mar.	5,180	4,346	3,638	4,223	4,204	3,856	11,651	11,675	9,086
Apr.	4,470	4,512	4,854	4,438	5,144	4,903	11,981	11,003	9,033
May	4,456	4,175	4,971	5,332	4,067	5,832	11,127	11,131	8,175
June	4,342	3,910	5,610	5,228	4,262	5,792	10,219	10,755	7,831
July	3,353	3,532	5,465	4,157	5,447	5,744	9,437	8,850	7,746
Aug.	3,533	3,993	5,014	4,308	4,739	4,976	8,697	7,805	7,793
Sept.	2,936	3,787	4,981	3,183	3,303	3,836	8,419	8,288	9,005
Oct.	3,287	4,051	5,123	3,010	4,055	4,081	8,657	8,291	10,089
Nov.	3,341	3,997	4,969	3,191	3,930	4,232	8,779	8,249	10,814
Dec.	3,778	4,051		3,109	4,081		9,455	8,196	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1928	1929	1930	1931	1932	1933	1934	1935
Production	80,180	68,829	52,420	48,333	36,891	42,556	46,228	47,879
Shipments	77,127	70,592	54,938	50,021	37,911	41,391	45,046	48,067
Inventory [2]	16,117	12,807	9,999	7,922	6,749	7,815	9,180	8,231

Figures for Recent Months

	PRODUCTION 1934	PRODUCTION 1935	PRODUCTION 1936	SHIPMENTS 1934	SHIPMENTS 1935	SHIPMENTS 1936	INVENTORY 1934	INVENTORY 1935	INVENTORY 1936
Jan.	3,551	4,259	4,592	3,199	3,722	4,168	8,403	9,621	8,623
Feb.	4,078	4,171	3,556	3,323	3,362	3,446	9,167	10,466	8,699
Mar.	5,194	4,123	3,787	4,118	4,168	3,796	10,244	10,406	8,692
Apr.	4,735	4,259	4,824	4,342	4,453	4,746	10,585	10,170	8,788
May	4,359	3,892	4,819	4,902	3,451	4,919	10,043	10,615	8,719
June	4,097	3,480	5,035	5,309	4,024	5,504	8,795	10,050	8,105
July	3,531	3,251	5,177	4,323	5,269	5,758	8,053	8,005	7,725
Aug.	3,680	3,894	5,039	4,198	4,556	5,136	7,555	6,939	7,621
Sept.	3,110	4,125	5,161	3,024	3,426	4,231	7,639	7,565	8,627
Oct.	3,219	4,435	5,397	2,689	3,987	4,108	8,151	8,053	9,977
Nov.	3,169	3,942	4,739	2,767	3,687	3,995	8,503	8,161	10,732
Dec.	3,503	4,048		2,850	3,962		9,180	8,231	

(1) These figures have been adjusted to represent 100% of the industry based on reports received by the Rubber Manufacturers' Association which represent 80% for 1931-1932-1933; 97% for 1934-1935; 81% for 1936. All figures through September, 1936, were revised in December, 1936. Annual figures are more accurate.
(2) Held by manufacturers at end of period indicated.
(*) Revised.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936	4,454,535	3,676,063	778,472	162,322	131,308	31,014	4,616,857
1936							
Jan.*	364,004	298,274	65,730	13,302	11,261	2,041	377,306
Feb.*	287,606	224,816	62,790	13,268	10,853	2,415	300,874
Mar.*	420,971	343,523	77,448	18,021	14,488	3,553	438,992
April	502,775	417,133	85,642	24,951	20,247	4,704	527,726
May	460,565	385,507	75,058	20,006	16,389	3,617	480,571
June*	452,955	375,894	77,061	16,400	13,126	3,274	469,355
July	440,999	372,402	68,597	10,475	8,192	2,283	451,474
August	271,291	209,754	61,537	4,660	3,051	1,609	275,951
Sept.	135,130	90,597	44,533	4,655	2,481	2,174	139,785
Oct.	224,628	190,688	33,940	5,361	4,592	769	229,989
Nov.	394,890	341,456	53,434	10,812	10,086	726	405,702
Dec.	498,721	426,019	72,702	20,411	16,542	3,869	519,132

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]							DUTCH EAST INDIES [1]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon [2]	India & Burma [3]	Sarawak [4]	British North Borneo [5]	Siam [4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China [3]	Amazon Valley	All Other [6]	World Total [7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	53,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,384	11,005	11,077	7,981	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1935:															
Jan.	56,720	15,142	41,578	6,294	1,097	1,536	1,238	2,614	3,812	5,340	9,342	2,533	1,196	739	77,319
Feb.	50,390	17,676	32,714	5,551	870	1,880	760	2,288	4,395	7,766	15,560	1,782	636	646	74,848
Mar.	47,407	13,437	33,970	1,720	651	1,874	773	2,076	5,592	7,956	8,400	1,873	740	693	66,318
Apr.	53,360	16,029	37,331	3,749	539	1,875	846	1,661	5,574	6,869	13,115	2,005	963	420	74,947
May	51,353	23,720	27,633	4,473	1,084	1,977	848	2,752	6,217	7,930	21,541	2,365	832	718	78,370
June	49,751	18,637	31,114	3,525	1,101	1,983	603	2,869	5,698	8,281	14,416	2,048	659	714	73,011
July	48,975	11,257	37,718	4,106	766	1,752	1,164	1,729	5,909	5,663	8,664	1,939	427	709	70,546
Aug.	51,873	10,978	40,895	5,683	565	772	566	2,328	4,660	6,923	9,087	2,433	1,150	725	75,787
Sept.	51,247	10,365	40,882	4,053	710	1,758	421	1,949	4,089	5,862	9,637	2,601	1,121	669	73,752
Oct.	48,258	19,364	28,894	5,932	1,284	1,684	1,040	2,679	3,937	6,711	16,818	2,260	1,292	714	73,245
Nov.	43,147	10,518	32,629	4,288	2,273	1,141	455	2,303	3,724	3,818	8,863	2,445	907	876	63,722
Dec.	37,838	7,529	30,309	4,942	3,028	1,233	171	3,079	3,881	5,206	3,854	4,532	1,352	1,122	62,709
1936:															
Jan.	39,101	12,582	26,519	4,178	1,299	2,317	938	1,665	4,315	6,347	9,381	2,449	1,606	839	61,853
Feb.	38,436	18,857	19,579	3,664	1,382	2,107	529	3,663	4,789	6,643	15,851	2,892	1,201	1,051	63,353
Mar.	46,552	12,026	34,526	4,336	1,324	1,848	342	2,966	4,484	5,052	9,225	2,553	1,264	751	68,671
Apr.	36,251	14,702	21,549	3,172	1,230	2,053	869	1,596	4,895	6,446	13,032	2,416	1,056	947	59,261
May	46,568	12,527	34,041	2,560	1,117	2,354	517	2,077	4,258	6,015	10,766	2,281	956	776	67,718
June	40,049	15,026	25,023	3,766	1,226	1,386	461	3,737	4,577	6,519	14,588	2,733	917	823	65,756
July	53,114	19,038	34,076	3,773	1,359	1,399	1,035	3,734	6,133	8,578	17,946	2,738	964	933	82,668
Aug.	43,506	13,361	30,145	3,940	776	2,541	656	3,284	4,978	7,353	12,106	3,017	542	1,054	70,392
Sept.	44,110	10,039	34,071	5,367	664	1,139	537	3,259	4,531	6,241	10,175	3,505	1,119	937	71,545
Oct.	46,543	12,960	33,583	5,599	1,181	2,143	1,086	3,349	6,477	8,145	12,881	3,874	1,255	1,105	80,678
Nov.	47,342	16,923	30,419	4,960	1,322	1,950	701	2,260	5,398	7,109	16,718	3,872	1,592	1,163	77,464
Dec.	38,714	9,758	28,956	4,377	1,844		506	2,988	6,472	10,129	9,536	8,450	1,721	1,087	76,072

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, 2,670 in 1929, and 1,274 in 1930. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons in 1924, 6 tons in 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928, and practically none in 1929, 1930 and 1931. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons in 1924, 2,239 tons in 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, 1,302 tons in 1929, and 2,636 tons in 1930. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands, and includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. * Figure is provisional: final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	30,678	61,223	17,000*	30,541	14,109	9,889	2,888	11,236	6,668	7,871	793,697
1935:															
July	47,694	9,454	3,247	4,929	1,319	4,484	1,298	1,823	520	572	157	800	548	185	77,030
Aug.	41,057	14,120	4,508	4,790	2,814	4,453	916	1,227	655	528	413	820	752	673	77,726
Sept.	35,256	11,223	3,740	5,453	1,604	3,590	1,696	1,593	449	806	282	1,030	793	914	68,429
Oct.	35,770	3,184	5,175	6,074	812	4,727	2,500*	4,876	929	539	671	1,000	597	742	67,496
Nov.	25,756	2,942	4,731	6,258	4,389	4,361	2,000*	4,859	783	449	245	1,206	1,044	1,276	60,298
Dec.	38,072	4,779	5,522	4,823	2,567	6,112	2,500*	4,906	1,019	1,074	287	1,359	750	1,466	75,236
1936:															
Jan.	33,260	4,573	6,755	5,545	1,759	4,355	1,500*	467	1,260	760	369	736	664	767	62,770
Feb.	33,789	1,271	6,264	5,257	1,900	2,786	1,000*	94	735	799	106	497	1,312	344	56,154
Mar.	33,743	—1,227	4,333	4,569	1,811	5,170	1,000*	4,376	819	1,033	339	754	1,113	410	58,243
April	44,948	2,097	4,250	5,497	1,079	4,929	1,500*	3,251	919	1,097	238	848	679	603	71,935
May	35,549	302	4,335	4,639	2,221	5,531	1,000*	4,220	1,034	698	103	657	500*	667	61,456
June	35,901	—1,493	4,846	5,698	2,042	4,567	1,500*	2,427	1,635	579	—27	650	500*	323	59,148
July	38,556	—766	4,621	6,837	2,274	5,126	2,000*	1,733	1,363	713	183	1,094	500*	495	64,729
Aug.	41,094	—1,581	4,513	6,556	3,781	4,305	1,500*	3,128	807	789	42	1,145	500*	989	67,440
Sept.	49,483	—12	4,393	6,006	2,393	5,195	1,500*	2,922	2,297	514	471	1,090	300*	624	77,176
Oct.	40,301	—87	4,752	7,232	3,110	6,600	1,500*	2,761	1,092	817	343	1,171	200*	1,026	70,818
Nov.	37,897	—742	3,282	6,500	4,308	3,961	1,500*	2,162	964	1,090	445	1,388	200*	823	63,778
Dec.	50,838	—4,926	4,688	7,458	4,000*	8,698	1,500*	3,000*	1,184	1,000*	276	1,206	200*	800*	79,922

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1] United States imports of guayule are included in this compilation. * Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

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1. May be used on all types of molds.
2. Does not build up a film in the mold.
3. It causes molds to "break" easily.
4. Gives a sheen or gloss to the finished product.
5. Does not discolor light colored goods.
6. Does not affect rate of cure.
7. Eliminates flying dust on uncured stock as it comes from the tuber or mixing mill.
Write for quotations and samples
STANDARD CHEMICAL COMPANY
AKRON, OHIO

This advertisement, published in our January 1937 issue brought in 65 inquiries in 30 days with more coming in every day, according to a letter received from the advertiser.

Here is what the Standard Chemical Company says:

"The inquiries we received were very gratifying. So far we have received 60 from companies in the United States and 5 from foreign countries. Hardly a day goes by but what we receive additional inquiries."

Just another proof of the pulling power of advertising in the RUBBER AGE—one of the world's outstanding rubber journals.

If you haven't used space in this publication recently, try it. We will not guarantee you 65 inquiries but we believe you will find it worthwhile.

THE RUBBER AGE
250 West 57th Street
New York, N. Y.

THE RUBBER AGE

Completes 20 Years of Publication

WITH this issue, March, 1937, THE RUBBER AGE completes 20 consecutive years of publication—two full decades of service to the rubber industry. In all that time it has held to the spirit of its original announcement of presenting, "in well illustrated and attractive form the latest and best technical information, and all the news of the industry."

It is difficult to realize that twenty years have passed since the initial issue on March 26, 1917. Much has occurred in the world since then—wars, revolutions, depressions, new inventions, new social ideas, even new taxes. In the rubber industry also, much has happened—scores of new products, new materials, new processes and new theories have been advanced, developed and adopted.

We have seen accelerators, antioxidants and many allied materials such as activators, and retarders come into universal use. Latex has had a rebirth and bids fair to revolutionize manufacturing methods. Synthetic rubber has at last become a reality.

We now have plasticizers, aromatics, dispersions, electrodeposition, softened rubber, rubber powder, casting of molded goods from latex, dispersed colors, rayon in tires, weftless cord fabric, enclosed mixers, watchcase vulcanizers, aging ovens, oxygen bombs—and many other developments which have taken place within the past 20 years.

Truly it can be said that no other period in the rubber industry has produced as many history-making ideas as the period from 1917 to 1937.

THE RUBBER AGE is proud of the role it played in helping to disseminate knowledge of all these important developments and thereby hastening the adoption of improved methods and materials to the betterment of the industry.

Like the industry itself, THE RUBBER AGE has passed through a series of developments. Starting in March, 1917, it appeared twice-a-month, an innovation which, coupled with the high calibre of its technical articles, its general attractiveness and readability, soon won for it many friends in the industry. Always progressive and alert, the journal consistently presented all the latest techni-

cal, news and market developments of interest to all branches of rubber manufacturing.

In its first year it started the publication of Dr. H. E. Simmons' "*Technical Course in Rubber Manufacture,*" later issued in book form by Van Nostrand. In 1924-26 it published a valuable series of articles on "*Vulcanization and Accelerators,*" by A. Dubosc, which was followed by a series on "*Rubber Regeneration*" by the same authority. Outstanding series of this nature have been a feature of the publication since its early days, among others being "*Purchasing*" by Robert C. Kelley and "*Reclaimed Rubber,*" by C. E. Bishop. Special issues also presented symposiums on "*Guayule Rubber*" and "*Reclaimed and Scrap Rubber.*"

When P. L. Palmerton, formerly head of the Rubber Division, Department of Commerce, became publisher in 1926, many new features were added, including a comprehensive statistical section, and immediately THE RUBBER AGE entered a new era of usefulness, resulting in still greater acceptance by the industry. Many outstanding editorial contributions were presented in the following years.

In February, 1933, the publication was changed to a monthly and was enlarged and modernized. Every issue continued to carry a well-balanced array of technical and general articles, all profusely illustrated, in addition to an enlarged news section and the market and statistical pages which had proved, and are proving, so popular. This steady improvement, reflected by each successive volume, continues. Original articles appear regularly, new features are constantly being added, and every means is taken to include material which will bring greater returns to its readers.

THE RUBBER AGE, recognizing the growing need in recent years for fundamental and technical information on latex, has published since 1933 two books on the subject, both of which have received the highest commendation from leading rubber technologists, viz: "*Latex and Its Industrial Applications,*" a bibliography, by F. Marchionna (1933); and "*Latex in Industry,*" a text book, by R. J. Noble (1936). In addition to these works, THE RUBBER AGE also published the first annual issue of the "*Bibliography of Rubber Literature,*" compiled by D. E. Cable. This first issue, brought out in 1936, covered the literature for 1935, and in addition included a Rubber Chemical Directory.

This work goes on. At the present time a new edition of Marchionna's bibliography is being prepared for early issuance. The first printing of Noble's text book is rapidly being exhausted and a new revised edition will soon be required. The "*Bibliography of Rubber Literature,*" covering the literature of 1936, is currently being compiled and will be available shortly. This second edition will be more than a bibliography of literature, however. The Directory section is being enlarged to include Rubber Manufacturers and Machinery and Equipment, and still other features which will make it a complete Directory of the Rubber Industry—a service which the industry has needed for years.

Thus ends the first two decades of progress and service. At the beginning of the third decade THE RUBBER AGE looks back with pride on its past accomplishments and views the future as an opportunity to be of even greater service to its readers—the rubber factory executives, the technologists and the suppliers of materials and equipment.

General Manager, THE RUBBER AGE

A New Book
Every Rubber Library
Should Contain

●

Annual BIBLIOGRAPHY of RUBBER LITERATURE

(Excluding Patents)

Compiled by

DONALD E. CABLE, Ph.D.

Technical Librarian, General Laboratories
United States Rubber Products, Inc., Passaic, N. J.

This bibliography, covering the literature of 1935, contains, in addition to the titles of 1073 articles, divided into 74 classifications, a complete author and subject index as well as an up-to-date list of rubber compounding materials by trade names, their uses and their sellers.

Since Bedford & Winkelmann's "Systematic Survey of Rubber Chemistry" appeared in 1923 there has been a distinct need in the rubber industry for an annual bibliography with complete author and subject indexes so as to facilitate a rapid search for any desired article or for all that has been published on any particular subject in the previous year.

Dr. Cable, by virtue of his training and experience, is eminently qualified to edit and compile this bibliography. He is Technical Librarian of the U. S. Rubber Products, Inc., in which capacity he is in constant touch with hundreds of publications dealing with every phase of rubber. In effect the Bibliography will be an index to all the rubber journals in the world and to articles on rubber in numerous other magazines, a service now available for the first time at a nominal cost.

It should prove indispensable to all rubber chemists, engineers, factory managers, superintendents, executives and purchasing agents as well as librarians, patent attorneys and others interested in what is being published on rubber.

132 pages—6 x 9 inches.

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THE RUBBER AGE

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